

Five Steps to Environmental Excellence

Green Zia Environmental Excellence Program Achievement-level Application: LOS ALAMOS NATIONAL LABORATORY ENGINEERING SCIENCES AND APPLICATIONS DIVISION

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Organizational Overview

0.1 Basic Organizational Description

Engineering Sciences and Applications (ESA) is a division of Los Alamos National Laboratory (LANL). LANL is owned by the Department of Energy (DOE) and operated under contract by the University of California (UC). Established in 1943 as part of the Manhattan Project, LANL's original mission was to develop nuclear weapons. LANL's mission has broadened to enhancing global security by ensuring safety and confidence in the U.S. nuclear weapons stockpile. LANL also applies its capabilities in addressing energy, environment, infrastructure, and biological security issues.

ESA Division's mission, **stewardship of nuclear weapons and enabling engineering technologies**, supports LANL's mission to reduce the global nuclear danger by continually improving, managing, and evaluating the nuclear weapons stockpile. ESA Division's organizational culture also incorporates a clearly articulated mission and goals (including continuous environmental improvement) built on the LANL goals. The alignment of ESA goals with LANL's is described in Table 0-1. The associated activities have provided ESA with many opportunities to excel in the environmental field (see Item 7.1). The types of facilities necessary to support our operations are shown in Figure 0-1.

ESA division consists of eight operating groups and the division office, with external environment, safety, and health (ES&H) support provided by partner organizations, as shown in Figure 0-2.

The FY 2001 budget for ESA Division was \$150,000,000, or approximately 10 percent of LANL's total budget. Significant amounts of this funding were used to underwrite the division's commitments for environmental support. In FY 2000, ESA subsidies for broad-based environmental services provided by the LANL Environment, Safety, and Health (ESH) Division amounted to approximately \$13,000,000. Further, ESA allocates approximately \$15,000 per year in Generator Set-aside Fees (GSAFs), which are levied on every unit of certain wastes we produce. **GSAF funds, administered by the Environmental Science and Waste Technology (E) Division Environmental Stewardship Office (ESO), are specifically earmarked by LANL for pollution prevention (P2) energy efficiency (E2) initiatives.** See Item 2.1. Finally, the LANL Facility & Waste Operations Division (FWO) recharges the division approximately \$2.50 per kilogram for disposal of hazardous waste.

In FY 2001, ESA Division employed 753 regular, full-time workers, or roughly 7 percent of the LANL workforce.



Table 0-1. Division goals align with LANL goals and derive from division actions.

LANL Goals	Division Goals
Safety First	<p>Strive for an injury-free workplace;</p> <p>Assure that ESA Division activities are conducted in compliance with all applicable safety, security, waste management, and environmental protection regulations and standards.</p> <p>Assure that operations at all division facilities present no unacceptable threat to the health and safety of the public, the workers, the environment or facilities.</p> <p>Work toward continuous improvement in safety and environmental importance.</p> <p>Implement the Five-step Integrated Safety Management Process.</p> <p>Foster employee involvement in safety programs.</p> <p>Track progress through Appendix F Self Assessment.</p>
Productivity and Strategic Business Development	<p>Maintain and certify the safety, reliability, and performance of the nuclear weapons in the U.S. stockpile.</p> <p>Execute a science-based program that is the basis for the National Stockpile Stewardship Program.</p> <p>Conduct surveillance on and manufacture those nuclear weapons components assigned to the Laboratory by the U.S. national program in a safe, secure, and environmentally sound manner.</p> <p>Provide and operate mission-essential facilities in compliance with applicable safety and environmental standards.</p> <p>Protect and strengthen DOE's national security mission.</p> <p>Recruit, train, and sustain skilled workforce.</p> <p>Benchmark activities against best-in-class standards.</p> <p>Prepare for and respond to emergent national security issues in a timely and effective manner.</p>
Tool Development	To ensure that our skilled personnel can carry out their responsibilities, we need to provide them with the appropriate tools.
Skill Development	ESA Division depends upon appropriate skills to carry out our stewardship mission.
Operational Excellence	<p>Develop and maintain a well-trained, motivated workforce that conducts all operations safely, securely, and in a fiscally prudent manner.</p> <p>Maintain existing facilities/infrastructure and acquire new facilities/infrastructure as needed to accomplish the division's mission.</p> <p>Create a safe, secure, environmentally benign, and employee-supportive workplace.</p>



Figure 0-1. Examples of ESA facilities.

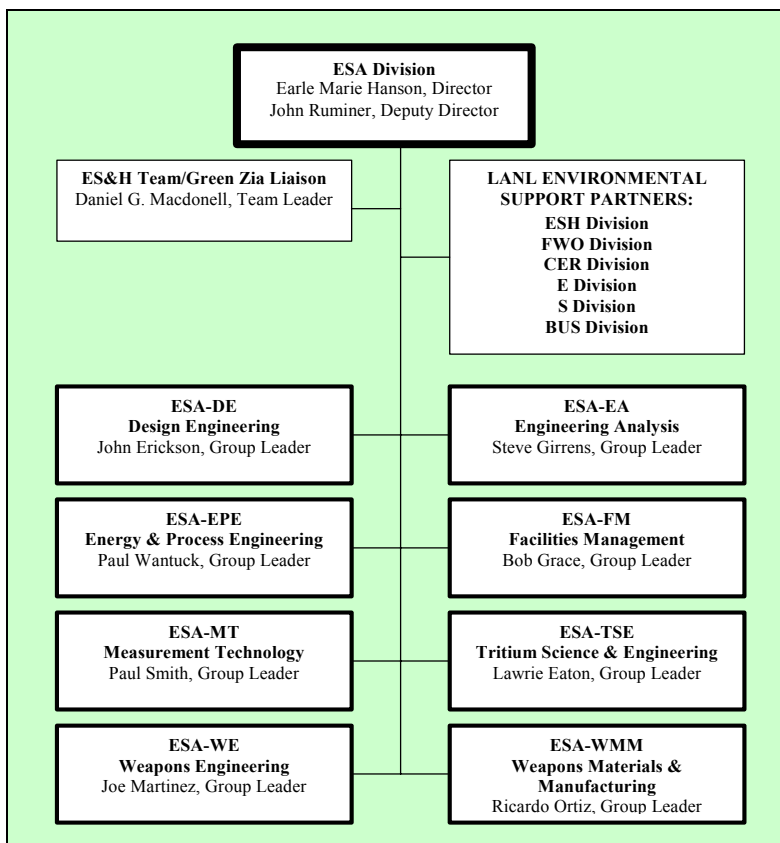


Figure 0-2. ESA Division organization chart and environmental support partners.

ESA Division is actively implementing a comprehensive environmental management system, a process map of which appears in Figure 0-3. The functionality of the environmental management system depends on

- internal initiatives under the leadership of the ESA Environment, Safety, and Health (ES&H) Team, which also serves as the ESA Green Zia Liaison;
- partnering with a wide range of Laboratory organizations and external stakeholders.

Internal initiatives promoted under ES&H Team leadership are discussed in Items 1.1, 2.2, 2.3, 3.3, 5.1, and 5.2. Initiatives driven by stakeholders are carried out through an extensive partnership network. Our principal environmental management partners are

- DOE, LANL's main customer;
- regulatory agencies, including Environmental Protection Agency (EPA), the New Mexico Environment Department (NMED), and the Occupational Safety and Health Administration (OSHA);
- the northern New Mexico community;
- the LANL ESH Division for P2E2 and worker safety:
 - Industrial Hygiene and Safety group
 - Water Quality group
 - Air Quality group



- Training group
- Quality Management group;
- the LANL Safeguards and Security Division (S) Emergency Management group;
- the LANL FWO Division Solid Waste Operations (SWO) group, for waste disposal and project management;
- the LANL E Division ESO group;
- the Community and External Relations (CER) Division;
- the LANL Business Operations (BUS) Division, for procurement and accounting.

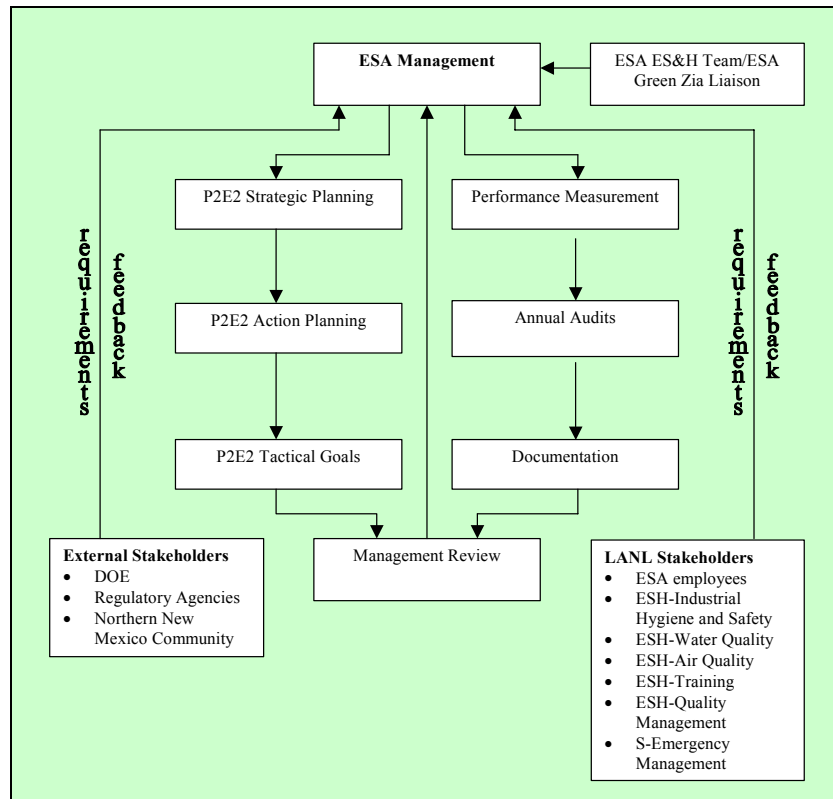


Figure 0-3. The ESA environmental management system.

0.2 Customer and Interested Party Requirements

Although ESA Division's primary customer is DOE, the division has identified the additional broad groups of customers: division employees; LANL customers, including technical programs and support divisions within the Laboratory; stakeholders such as UC and the surrounding communities and pueblos; the Department of Defense; and the American public. Each group of customers has a specific set of environmental expectations for ESA Division. Those expectations also include a general commitment to safe operations and efforts to minimize waste generation and consumption of resources.

ESA's minimum environmental expectations are to meet federal and state regulatory requirements. Federal agencies whose standards apply to LANL operations include EPA,



DOE, the Department of Transportation, OSHA, and the Defense Nuclear Facility Safety Board (DNFSB). NMED also oversees and regulates LANL activities. Most ESA waste is regulated under the Resource Conservation and Recovery Act, the National Pollutant Discharge Elimination System, the National Environmental Policy Act (NEPA), and the DOE Explosives Safety Manual. In addition to regulatory expectations, LANL operations, including ESA Division's, are shaped and evaluated by contractual requirements negotiated annually by DOE, UC, and LANL in Appendix F of the DOE-UC contract. **Appendix F, the key driver for LANL operations, lays out performance objectives for a wide variety of systems that are central to Green Zia core values, such as**

- Management roles, including leadership expectations, accountability for environmental, safety, and health, regional economic development, and relationships with surrounding communities.
- Developing a system for performing work safely and in an environmentally responsible manner, referred to as Integrated Safety Management (ISM). It is this program that **is responsible for continuous environmental improvement** and is very similar to the Deming Cycle championed by Green Zia. Tools developed by ISM, such as hazard control plans (HCPs), are key to understanding how the Laboratory involves employees.
- How the Laboratory is held accountable to DOE, other customers, suppliers, and regulatory agencies.
- Information management, including strategic and tactical information technology, records management, and resource allocation.

Items 1.1, 2.3, 3.1, 3.3, 4.1, 4.2, 5.1, and 5.3 discuss **the issue of accountability** in connection with Appendix F performance measures and other mandated assessments. Appendix F serves as the main mechanism for determining both customer expectations and organizational performance. DOE and UC evaluate overall LANL performance, to which ESA Division contributes, on environmental components of Appendix F. ESA prepares a quarterly Self-assessment Report to track performance on the Appendix F expectations.

0.3 Supplier and P2E2 Partnering Relationships

LANL is aggressively moving toward a Laboratory-wide P2E2 policy to support its integrated ES&H system. Consistent with an integrated system, direct responsibility and accountability for managing the division's ES&H practices are shared by ourselves and by other LANL partner organizations. Throughout this application, we identify where spheres of responsibility and accountability for division ES&H practices are shared. **To the extent that our ES&H practices are the product of extensive consultation with partner organizations, and to the extent that we subsidize partner organizations by means of recharges and fees, their successes—and failures—in the ES&H arena are ours, as well. Accordingly, when application guidelines present an area to consider, we cite not only our own activities but also relevant activities carried out by partner organizations.**



Over half of LANL's \$1.56 billion operating budget is for the acquisition of goods and services necessary for operations. LANL's BUS Division is responsible for the oversight of these major subcontracts. The division's key suppliers are the approximately 40 vendors managed by the Just-in-Time (JIT) Program, which accounts for 71 percent of all institutional procurement transactions annually, and the labor contract companies who provide additional men and women to the workforce.

BUS Division manages all supplier relationships under terms of the supplier contracts and as demonstrated in the supplier process. Because key suppliers' performance directly affects the division and the entire Laboratory, quality expectations and performance requirements are clearly communicated. Where applicable, BUS Division affirmative procurement experts ensure that routine products, such as office supplies, conform to any applicable environmental provisions such as recycled content.

All federal agencies are committed to P2E2 policies by Executive Order (EO) 13101: Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition. EO 13101 and Section 23.704 of the Federal Acquisition Regulation identify and promote the purchase of “green” products and services. LANL’s Green Purchasing program was developed to implement this order. The DOE goal for green purchasing is to purchase 100 percent EPA-designated items with recycled content, except when not available competitively at a reasonable price or when not meeting performance standards. This goal is an Appendix F performance measure included in the LANL-UC contract. One of the results of ESA’s implementation of this program is that more than half of all of our office products are purchased from green suppliers, relying heavily on recycled materials. Every order is evaluated for the ability of green suppliers to fill them; these suppliers are bypassed only when they do not offer the needed item, the cost is considerably higher, or they cannot supply it in a timely manner.

ESA relies on BUS Division to provide us with vendors that meet all of the Laboratory’s goals for P2E2 suppliers. However, ESA has independently excelled in developing P2E2 partnerships with recyclers; see Item 7.1 for details on recycling initiatives at our machine shops, other recycling efforts, E2 fuel substitution and utilities conservation, and waste separation.

0.4 Competitive Situation

Within the LANL organization, there are no direct competitors who can perform ESA’s primary work functions. However, there are competitors for both programmatic funding and funding for specific projects within LANL. In addition, there are other entities within the DOE Complex, such as Lawrence Livermore National Laboratory (LLNL) or Pantex, who compete for customer dollars. ESA is thus required to find ways to both justify operating expenses and improve operating processes to make maximum use of available funding. Because both DOE and UC use the Appendix F measures to evaluate performance at the three R&D laboratories managed for DOE by UC—LANL, LLNL, and Lawrence Berkeley National Laboratory—the annual evaluations provide a means of comparing performance levels among the three institutions.



0.5 Strategic Context

Using the five-step ISM process to plan work provides ESA workers with an opportunity to identify environmental hazards and provide controls to minimize negative impacts. One of the changes that LANL and ESA have made over the past five years in our ES&H strategy, that of deploying ES&H Team members from ESH Division to work directly for operating divisions, has made this process more effective. These relationships have built trust between operating groups and ESH and provided much better guidance in environmental compliance and waste reduction.

The Laboratory, as a DOE facility, also has many requirements that drive environmental excellence beyond that expected of industry. For instance, in the last half of the 1990's LANL spent nearly \$30,000,000 preparing a Site-Wide Environmental Impact Statement (SWEIS), required by DOE, that looked at impacts of operations on the environment and identified measures to mitigate impacts, including reductions in water and electricity consumption and waste generation. This document adhered to the five steps:

- identifying the work that would be done at LANL under various alternatives;
- identifying the environmental, socioeconomic, and social justice “hazards” that could result from LANL operations;
- identifying controls for those operations;
- performing the analysis;
- identifying where the Laboratory could improve our environmental excellence and developing mitigation plans to address these areas.

Through a strategic cooperative venture with the E Division ESO, ESA has systematically assessed its environmental performance and sought ways to employ new technology and new ways of process management, thereby improving its operational efficiency. The successes of ESA's efforts are identified in Chapter 7. Continued participation in the New Mexico Green Zia Environmental Excellence Program provides another opportunity for the Division to analyze and continuously improve its environmental performance, especially through the anticipated feedback from Examiners.



1 Leadership

1.1 Organizational Leadership

The vision and commitment of LANL's management at the Laboratory Director level to continuous environmental improvement is defined by the following Appendix F, Section C citation:

The Laboratory's goal is to accomplish its mission cost-effectively while striving for an injury-free workplace, minimizing waste streams and avoiding adverse impacts to the environment from its operations.

Performance Objective 1: The Laboratory systematically integrates ES&H into management and work practices at all levels so that missions are accomplished while protecting the worker, the public, and the environment.

The tool developed by the Laboratory to implement this vision is ISM. ISM is defined in Appendix F, Section C, as a "system founded on **management commitment** and **worker involvement** in performing work safety, assuring protection of employees, the public, and the environment. The term 'integrated' indicates that the safety management system is a normal and natural element in the performance of work."

ISM is incorporated into all business practices by applying a five-step process (see Figure 1-1). The steps are designed to assure continuous improvement.

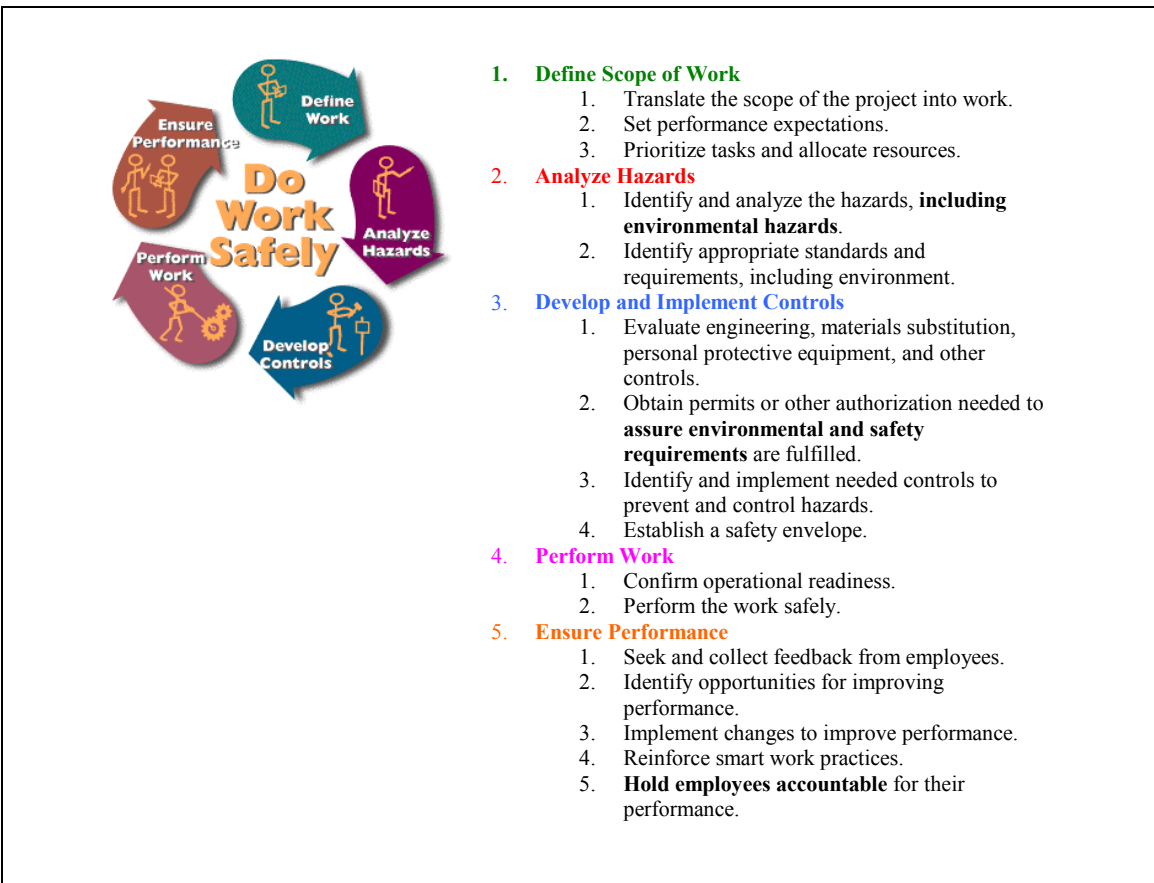


Figure 1-1. The five-step ISM process.



Area to Consider: How does management demonstrate commitment to continuous environmental improvement at all levels of your organization, and how is it integrated into core business practices?

ESA's senior leaders have communicated this vision through the ESA Division Plan for ISM. The ESA Division Director, Deputy Division Director, and every Group Leader sign this plan. In the plan, division management defines its expectation as

ESA Division management supports the ISM objective to work safety, and recognizes Integrated Safety Management as the overarching policy for assuring the safety and protection of workers, the public, and the environment including pollution prevention and waste minimization. . . . Line managers and employees in the division are responsible for their own safety and the safety of those around them. Line managers are responsible and accountable for safety performance. Safety depends upon the attitudes and behaviors of our workforce, with every member sharing responsibility for effective ISM.

To assist in assuring that ES&H matters are incorporated into all facets of operations, ESA Division has eight ES&H specialists directly supporting ESH Division activities and two Waste Management Coordinators (WMCs), whose duties are to coordinate activities in these areas, assist employees with safety, health, and waste problems, and to bring relevant issues to the attention of managers. These ES&H specialists and WMCs serve the entire division and work actively with all personnel in the groups. As required they make presentations to ESA employees. They are the point of contact on P2E2 issues.

ESA embraces the philosophy contained in the Green Zia Environmental Excellence Program. Team leaders, group leaders, and division directors receive training in use of tools to evaluate and improve process performance. Through the submission of a 2001 Green Zia application, the ESA Division Director is reinforcing the importance of P2 and environmental excellence. During the coming year, managers will further the understanding and use of the Green Zia Program throughout the division.

Area to consider: How does management demonstrate commitment to continuous environmental improvement on par with other major organizational goals through policy statements, incorporation and integrated into other programs, and other activities?

The commitment to put safety, including environmental safety, on par with other major organizational goals is clearly demonstrated by the ESA ISM plan expectation: Safety must take precedence over programmatic work with all workers having the responsibility to stop work if they believe it to be unsafe.

The way ISM is integrated into programs and activities is partially described elsewhere in this chapter and extensively discussed in other chapters of this application. Therefore, it will not be elaborated under this area to consider.

Area to consider: How does management assure commitment to continuous environmental improvement at all levels of your organization, and how is it integrated into core business practices?

ISM applies to planning and decision making at all levels. For example, every operational activity at LANL, from office work to mission-related "industrial" activities, must have a formal HCP that addresses each of the five steps. An expanded description of the HCP process is provided in Items 2.3 and 6.1. Workers are directly involved in the writing of



these plans (Steps 1-3) as well as performing the work (Step 4). Management is responsible for the approval of HCPs, as described in Item 6.1.

Area to consider: How does management assure that continuous environmental improvement is incorporated into strategic plans, action plans, and performance measures, and how does management review results and assure that they are tracked throughout your organizations?

ESA's ISM Plan commits to the following: "To realize improvement we must put in place appropriate metrics that measure our performance, identify meaningful opportunities for improvement, and track our progress."

The quarterly ESA Division Appendix F Self-assessment is the tool ESA uses to track results throughout all of the division. This process measures environmental performance, routine waste minimization, management walkarounds, hazards analysis and control, injury/illness prevention, and other types of metrics. Evidence of commitment to ISM includes

- The past two DOE Division Review Committee reports gave ESA an "Outstanding" for ISM.
- ESA's quarterly Self-assessment, conducted for 11 quarters, rated ESA as "good" in last 8 quarters and acceptable in the first 3 quarter. There were no "unacceptable" ratings.
- The division's lost workday cases, which in 2000 were consistently lower than LANL's overall results (see Figure 5-2). The self-assessment ratings for accidents were "good" for 9 quarters and "acceptable" for 2 quarters. There were no "unacceptable" ratings.

The self-assessment data is available to all line managers and identifies areas requiring management attention. Senior management requires correction and allocates resources, when necessary, to remedy problems identified.

DOE, ESH Division, LANL's Audits and Assessments Group, and ESA itself track compliance with this performance measure through a series of audits. These audits affect the Appendix F ratings and, ultimately, the ability of UC to retain their contract with DOE.

Area to consider: How does management conduct proactive communication with regulatory agencies, employee customers, lenders, suppliers, investors or other interested parties to improve environmental performance and gain support for and communicate related successes?

ESA's management relies on frequent and open communication. Group managers meet with employees on a weekly and sometimes daily basis and meet monthly with the entire organization in formal sessions. Formal meetings often focus on expectations and progress toward goals. The sessions include not only programmatic and technical information, but also discussions of environmental issues, safety, and P2E2. One method of ensuring contact with workers is for all levels of ESA management to conduct regular safety walkarounds. Nine categories of walkaround guidance cards were created, including environmental protection, suggesting areas and activities managers should observe. In 2000, ESA managers performed 470 walkarounds (see Figure 5-3).



ESA does not communicate directly with regulatory agencies. ESH Division carries out this function.

1.2 Community Leadership

Appendix F, Section A, Laboratory Management, recognizes the importance of communicating with the community:

Performance Objective 4.0, Citizenship: Laboratory leadership addresses community issues in a proactive manner.

Performance Measure 4.1.a, Community Relations: Evaluation of Laboratory senior management's awareness of and response to public concern regarding Laboratory operations. Assessment will focus on senior management's effectiveness in addressing community issues in a proactive manner.

Performance Objective 4.0, Citizenship: Laboratory leadership addresses community issues in a proactive manner.

This commitment is reflected in LANL's five-year Strategic Plan, which states

Accomplishment of the Laboratory's programmatic mission requires outstanding science, engineering, and technology development. However, producing outstanding technical results is not enough. As an institution dedicated to public service, it is crucial that the Laboratory activities be carried out in a safe, healthy, and environmentally benign manner. . . . Laboratory operations must be carried out in a cost-effective manner, with a view toward continual responsibility for stewardship of resources provided by our sponsors. **These operations must also be carried out in a manner that involves the Laboratory's surrounding communities. For the Laboratory to be effective, these communities must be partners in ensuring its success.** The Laboratory has a stake in improving the science education, economic development, and health of the communities surrounding it as well as in the safety of the environment.

Area to consider: How does your organization address Environmental Justice issues and gain an overall understanding of existing environmental problems or circumstances such as air quality or water availability specific to the community? How does it develop strategies to reduce its operational impacts on these issues? How does your organization work with others in a collaborative way to conserve resources in the community?

One of the most important tools that DOE facilities use to inform the public of the impacts of operations and demonstrate continuous improvement is the SWEIS. This document covers subjects from environmental justice to air and water quality impacts to resource conservation. Any adverse impact on the community or environmental sustainability must be addressed and mitigated. ESA staff worked for several years on the SWEIS with DOE contractors to prepare information on how our operations impact air, water, land, cultural, ecological, and biological resources; human health; environmental justice; and socioeconomics. The SWEIS was provided to the public for review and comment. With regard to P2 and resource conservation, specific measures the Laboratory has committed to mitigate include

- **Managing electric power demands** to prevent periods of brownouts by adjusting to the limitations of available power until a solution for a long-term increase in the power supply is in place;
- **Managing water demands** at LANL to prevent exceedences of DOE's water rights;



- **Reducing waste generation** from routine operations by 80 percent by December 2005, using 1993 as a baseline.

ESA is affected by, and participates in, achieving these mitigation measures. One recent ESA project reduced water usage in high-explosives (HE) operations from 3,000,000 gallons a year to only about 300,000 gallons a year through treatment and reuse. Another ESA five-year plan will phase out old, energy-inefficient buildings and equipment, if funding can be obtained. These and other ESA waste- and energy-reducing projects are also discussed in Item 7.1.

Area to consider: How does your organization participate in community redevelopment (through programs such as Brownfields Redevelopment) and local economic development through siting of facilities and community enhancement to reduce overall impacts to the community?

The LANL Comprehensive Site Plan addresses siting of facilities to reduce environmental, cultural, and biological resource impacts. This type of information is used by ESA when developing plans, such as the ESA Five-year Plan, for siting of new facilities. This plan is also available to the public. LANL also assisted DOE in writing an Environmental Impact Statement for transfer of DOE property to the community to assist local development.

ESA does not specifically work with contaminated sites, such as Brownfields Redevelopment. This is performed by the LANL's Environmental Restoration (ER) Program, who at times is responsible for cleaning up legacy contamination in the community, as well as at the Laboratory site.

Area to consider: How does your organization support community-based environmental protection and sustainability activities in the community? If such activity is not occurring in a community, how does your organization encourage the establishment of such programs through civic groups or other business activities? How does it align its own activities to support such initiatives?

In addition to the SWEIS and the Comprehensive Site Plan, LANL supports an active community outreach program to both to inform and involve the community in Laboratory decisions, as well as to support environmental issues and activities in the community.

Because it is part of the larger LANL organization, ESA Division has limited interaction with the public related to environmental issues. LANL has designated the Community and External Relations Division to routinely handle interactions with the public. Presentations, discussions, and workshops specifically focused on environmental issues are typically coordinated through LANL's ESH Division or E Division. The Laboratory encourages public access to information about environmental conditions and the environmental impact of operations at the Laboratory. Although the Community Relations Office has the responsibility to help coordinate activities between the Laboratory and northern New Mexico, many Laboratory organizations, including ESA, are actively working with the public. Frequently, the subject of these interactions is related to environmental issues because of the Laboratory's potential impact on local ES&H. During 2000 considerable resources were expended on responding to the impacts of the Cerro Grande Fire in addition to more routine environmental inquiries.



Some examples of how the Laboratory participates in community-based environmental protection and sustainability activities in New Mexico are its participation in the

- East Jemez Resource Council, a highly effective means of improving interagency communication and cooperation in the management of resources on a regional basis;
- Cochiti Lake Ecological Resources Team, an interagency forum for discussing issues pertaining to the status or management of physical, biological, and recreational resources in the vicinity of Cochiti Lake and White Rock Canyon;
- White Rock Canyon Reserve, formed to determine what land might be suitable for designation and use as a wildlife reserve;
- Pajarito Plateau Watershed Partnership, to protect, improve, and/or restore the quality of water in the Pajarito Plateau Watershed;
- ER Communications and Outreach Team, formed to coordinate public involvement activities such as public meetings, tours, media, and general outreach activities for issues concerning the ER Project;
- Citizens' Advisory Board, formed to provide opportunities for effective communications between the diverse multicultural communities of northern New Mexico, the DOE, the Laboratory, and state and federal regulatory agencies on environmental restoration, environmental surveillance, and waste management activities at the Laboratory.

Other of LANL's community outreach programs that have an environmental protection element include these organizations: the Bradbury Science Museum, the Community Relations Office, the Community Service Policy, the Government Relations Office, *The Laboratory Connection* newsletter, the Neighborhood Environmental Watch Network, Community Outreach Centers, Community Relations Office Technical Assistance, Tribal Relations, the University of California Northern New Mexico Office, the Volunteer Program, and Workplace Giving Programs.

Information on these programs, reports, town meetings, and other community involvement programs is available to the public on the LANL web at <http://www.lanl.gov/worldview/>. ESA participates actively in many of these programs. ESA staff submits information to these programs on any of our activities that are of interest to the public. We prepare technical documents such as permit applications for submittal to regulatory agencies and the public. In support of ESA activities, staff members may meet with regulatory agencies to clarify activities or represent the Laboratory at public meetings. ESA personnel also participate in LANL-sponsored community outreach activities.

Area to consider: How does your organization set affirmative procurement goals such as buying "green" products or products with recycled content? How does your organization use its affirmative procurement goals to support local businesses by purchasing locally available materials to support the local economy; waste exchanges; and other related activities such as industrial ecology, value-added reuse of materials, and recycling?

LANL'S affirmative "green" procurement program has been discussed in Item 0.3.



A key aspect of LANL procurement, including that of ESA Division, is to support, whenever possible, local vendors, especially small businesses and those owned by minorities and women. Each year the BUS Division Small Business Office (SBO) establishes socioeconomic goals and northern New Mexico procurement goals. Whenever possible, ESA Division attempts to purchase materials locally. The SBO also provides guidance to local businesses regarding such matters as establishing proactive P2E2 programs and using/providing products with recycled content.

LANL also participates in the Small Business Initiative (SBI), funded by DOE Defense Programs, and the Technology Commercialization Office, which provides small-businesses access to the technical expertise of DOE national laboratories. Since FY 1996, the Laboratory has focused this program specifically on business development in northern New Mexico. In 1999, the Laboratory supported 12 SBI projects at approximately \$1,500,000 through regionally focused, cooperative R&D agreements with northern New Mexico small businesses.

A snapshot of local LANL investments:

- Laboratory regional procurement in FY 1999 was up 84 percent over FY 1996.
- Over the past two years, \$13,500,000 has been invested in northern New Mexico start-up companies.
- The Laboratory supported 12 SBI projects with approximately \$1,500,000 provided through regionally-focused cooperative research and development agreements.
- Eight regional companies received technology-maturation contracts valued at approximately \$800,000.
- The Laboratory took a major role in developing the region's telecommunications infrastructure.
- Laboratory officials participated in the groundbreaking for the Los Alamos Research Park adjacent to Technical Area (TA) -3. The first building is now ready for occupancy.
- The Laboratory continued its participation in the National Welfare Reform Initiative. Twelve welfare recipients are being trained at the Lab. Within 24 months, on-the-job training will be provided to 48 welfare recipients.

Area to consider: How does your organization support mentoring of other businesses in the community to promote pollution prevention and continuous environmental improvement.

LANL is very active in mentoring other businesses and communities to promote P2E2. A number of these programs have already been described previously in this chapter. Another force for technology transfer is at work for LANL. Enactment of the Bayh-Dole Act (P.L. 96-517), the "Patent and Trademark Act Amendments of 1980," on December 12, 1980, created a uniform patent policy among the many federal agencies that fund research. The stability provided by the Act has spurred universities, including LANL, to transfer technology from their laboratories to the marketplace. Information on the Laboratory's Technology Transfer Program is available at <http://aha-public.lanl.gov/cgi->



[bin/tools/aha/aha2.cgi?category_path=%2FIndustrial Technologies](http://bin/tools/aha/aha2.cgi?category_path=%2FIndustrial_Technologies). Of the programs listed there, ESA operates the Fuel Cell program. This research aids the development of fuel cell systems for clean power generation. The overall goal is to reduce greenhouse gases, increase energy conversion efficiency, and reduce pollutant emissions.

Area to consider: How does your organization communicate its environmental performance with the community through annual reports, town meeting, web pages, or other means?

All of LANL's environmental activities are reported annually in the Environmental Surveillance at Los Alamos report. This comprehensive report is about 300-400 pages and contains information on

- management initiatives, including ISM;
- compliance status for federal and state regulations;
- an environmental radiological dose assessment;
- air monitoring results;
- surface water, groundwater, and sediment monitoring;
- soil, foodstuffs, and associated biota monitoring.

In addition, LANL holds town and public meetings to inform residents of surrounding communities about environmental activities and operations at the Laboratory. This information is published annually in the CER Division's Annual Report of Regional Involvement. The annual yearbook of the SWEIS provides further information to the public.

Official documents pertaining to ESA Division are available at <http://www.esa-do.esa.lanl.gov/esadocs/esadocs.html>. This web site provides links to ESA quality procedures, standard operating procedures (SOPs), administrative procedures, emergency procedures, HCPs, self-assessments, and Appendix F reports.

2 Planning for Continuous Environmental Improvement

2.1 Strategic Planning for Environmental Improvement

As has been discussed in previous Chapters, Appendix F is LANL's strategic environmental management plan, and ISM is the tool used to implement the plan. To implement Appendix F environmental measures within ESA, the division has developed its own ISM plan. The ESA Division ISM plan includes specific division goals and actions that respond to the LANL environmental strategies. Figure 2-1 gives an overview of the ESA strategic planning process.

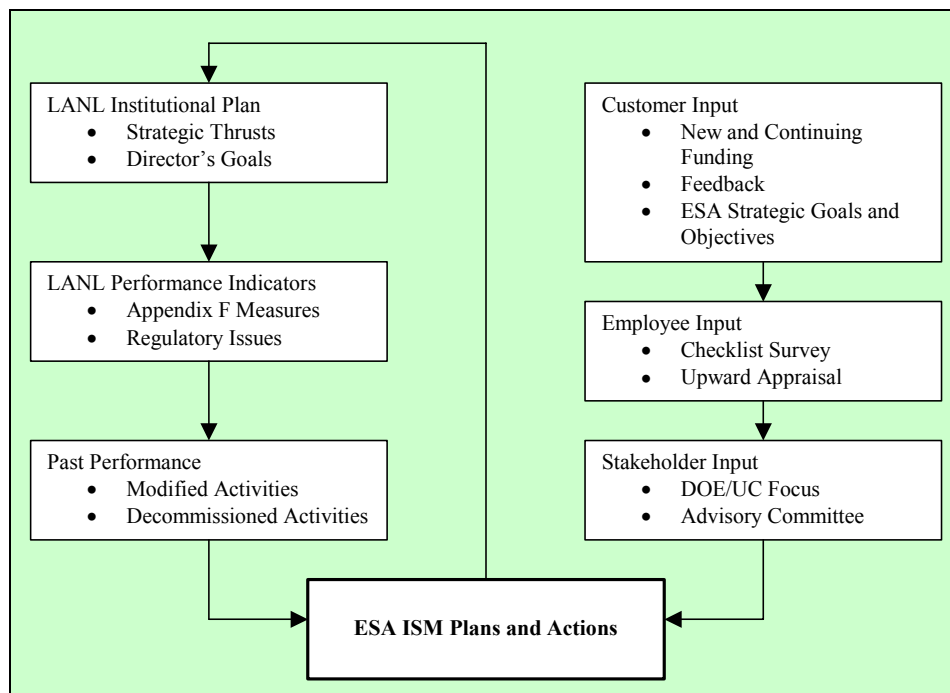


Figure 2-1. The ESA strategic planning process.

Environmental improvement and P2E2 is specifically addressed in Appendix F and reflected in Section 7.7.3, Environmental Excellence, of the ESA Division Plan for ISM:

Institutional Expectation: Along with worker protection, ISM includes the protection of the environment, waste minimization, and pollution prevention

Division Expectation: ESA is committed to environmental excellence and to supporting waste minimization and pollution prevention initiatives. The division expects every group to consider the environmental impact (waste generation, storage and minimization; and pollution prevention options) for all operations.

Both Appendix F and the ESA ISM plan contain a number of metrics against which ESA's performance is measured.

Area to consider: How does your organization use information from the environmental management system in other planning initiatives such as capital budgeting, procurement activities, strategic planning, marketing and sales management, accounting, productivity improvement, and other top management initiatives.

Area to consider: How are vendors, suppliers, customers, and other stakeholders involved in the environmental component of the planning process, for example: two-way relationships with vendors for inventory control, just-in-time manufacturing, use of safe materials and other areas?

The Appendix F performance Objective 1.2c of minimizing waste through aggressive P2 and the ESA expectation cited above significantly affect other planning initiatives such as budgeting, procurement, and strategic planning. How the environmental management system affects productivity is difficult to measure for a non-production facility such as LANL. One measurable increase in productivity has been the decrease in lost work time. This is discussed in Chapter 5.



Procurement is an area where the environmental management system has a major effect. For instance, Chapters 0 and 1 contain information on how Appendix F goals drive Green Purchasing, community involvement, and partnering with New Mexico businesses for the purchasing of local products as well as for recycling. Accounting systems have been implemented to track progress in this program.

Another important purchasing program is LANL's relationship with Fisher Chemicals, who provides JIT and inventory control for ESA as well as the rest of the Laboratory. ESA encourages employees to use Fisher as the vendor whenever possible because chemicals received from Fisher already have a LANL chemical barcode applied and are entered into the Laboratory-wide chemical tracking system. ESA uses the chemical tracking system to identify whether workers are exposed to any hazardous chemicals and to provide information to emergency responders on the types of chemical hazards they may encounter. ESA also uses this data as a way of determining where chemical substitution is important. For instance, we have been able to identify carcinogens used or stored and provide substitutes that were less hazardous.

Capital budgeting strategies and strategic planning are also affected by the environmental management system. One P2E2-related capital budgeting program that LANL has established is GSAF. A fee is collected (\$0.75 per kilogram in FY 2001) for all non-remediation wastes generated at the Laboratory. The LANL-wide GSAF funds (about \$500,000 per year) are typically used to purchase new P2E2 capital equipment, with the proposing group paying for installation and testing. Projects are prioritized and recommended by the Laboratory's Pollution Prevention Council. ESA has received several ESO P2 awards; some of those projects are discussed in Items 5.3 and 7.1.

DOE also supplies capital equipment funding for P2E2 and environmental compliance in certain cases. While the Green Zia criteria discourage anecdotal data, ESA believes this is a situation where an example might be useful.

Example: ESA uses a considerable amount of water to perform its mission-related operations involving HE. Since the 1950s, HE-contaminated wastewater had been discharged to the environment through a series of outfalls, where the level of HE built up. Regulatory agencies expressed concerns about this environmental contamination. To respond to this concern, ESA, DOE, EPA, and NMED partnered to plan a solution. The solution was one that had to reduce the concentrations of HE discharged to the environment. However, this team also identified another goal—that of reducing the amount of water used for HE processing, approximately 3,000,000 gallons per year. Because this was a complex issue, ESA mechanical and HE engineers worked to develop a strategy that would satisfy these two requirements. The team studied what other HE processing facilities were doing and found that the Pantex Plant, another DOE facility, had a good solution to the problem. Therefore, Pantex and the vendor able to supply the technology were also added to the team. Because the plan involved new equipment and contractor services, partners such as BUS division, who handles procurement and budget tracking, and vendors with expertise in controls were also added to the team. After the strategic plan was developed, it was presented to management for approval. Once approval was obtained, this project went into the action-planning phase, discussed in Item 2.2.



Area to consider: How are employees included in the environmental component of the planning process.

Employees are included in every facet of the environmental strategic planning process. First, non-management and management employees worked together to develop the LANL ISM plan. This partnership was also present in developing the ESA ISM plan. Secondly, technical staff members from the ESA-ES&H Team and from the operating groups serve on committees to draft the Laboratory Implementation Requirements (LIRs), which Appendix F uses to track requirements for environmental management. Third, as the example described above demonstrated, employees are the team members who are best qualified to formulate technical solutions during environmental strategic planning.

Area to consider: How does your organization anticipate and mediate external impacts.

Area to consider: How does your organization consider the long-term environmental impact of the business on environmental sustainability and how does your organization consider environmental sustainability in the design of products or processes over time.

The Laboratory has a specific process, mandated by NEPA, which requires that the impact of activities at the Laboratory on the public and environmental sustainability be assessed. Under this regulation, LANL produced the SWEIS. See the information on the LANL SWEIS covered in Items 0.5 and 1.2. ESA is affected by, and participates in, achieving the mitigation measures resulting from the SWEIS for energy conservation, water conservation, and waste reduction. In addition, new or modified projects that were not covered by the SWEIS are also subject to NEPA evaluations. This is done by preparing an ESH Identification (ESH-ID), which is discussed under Item 2.2. The ESH-ID is also the mechanism by which the environmental sustainability of each new or modified project is addressed.

Area to consider: How does your organization address compliance with safety, health, environmental, and other applicable regulations as part of the planning process?

ISM requires that all work and all workers meet the safety and environmental responsibility requirements defined by the Laboratory requirements system, as documented in appropriate Laboratory Performance Requirements (LPRs), LIRs, and any supplemental requirements defined for a specific facility or activity. LPRs govern the conduct of specific types of work. ESH Division, with assistance from operating group personnel, prepares LIRs for each applicable environmental regulation.

2.2 Action Planning

Action planning flows from strategic planning, as described above. The steps in action planning for the example described in Item 2.1 are shown in Figure 2-2. Action planning utilizes Steps 1-3 of the ISM process. Steps 4 and 5 are the implementation steps, described in Item 2.3.



Area to consider: How are action plans developed to support process analysis and improvement plans?

Area to consider: How do action plans address regulatory compliance issues?

ISM Step 2 references a LANL process called the ESH-ID process. ESA uses this process extensively to identify hazards. Early in the development of a new or modified process, the ESA-ES&H Team works with the project team to describe the process and identify all potential environmental air or water releases, any solid wastes or wastewater that might be generated, any hazardous chemicals used, and other information needed to determine environmental impacts and safety concerns. Controls that will be used to mitigate environmental or safety impacts are also documented in the ID. ESH Division posts the ID on the web, where it is accessed by ESH, E, FWO, and other Laboratory organizations, who provide feedback. Permits, notification, and other documentation needed are identified at this stage. E-ESO reviews the ID for P2E2 opportunities and suggests methods to achieve P2 and energy savings. DOE reviews the project with regard to NEPA regulation requirements to determine whether the project is significant and requires an environmental assessment or environmental impact statement to assure that there are no significant adverse impacts and that the project is environmentally sustainable.

Area to consider: How are employees included in the development of action plans?

As described above, employees and other stakeholders are involved in every step of action planning. Technical staff proposes approaches, which are reviewed by other stakeholders such as DOE and regulatory agencies and must ultimately be approved by management. The ESA-ES&H Team and project technical staff prepare the ESH-ID and ensure that all comments are integrated into the implementation of the project.

Area to consider: How are suppliers, vendors, customers, and other interested parties included in the development of action plans?

Stakeholders in the environmental management system—DOE, the public, regulatory agencies, and the employee themselves—are all considered in the development of action plans. DOE is an integral partner for all action plans, whether they are covered in the SWEIS or new/modified projects covered by the ESH-ID process. Regulatory agencies may also be directly involved when a solution is complex. For example, EPA reviewed the plan to treat and recycle HE wastewater and revised the water quality permit that covered its discharge to incorporate the new systems. Vendors and suppliers may be involved directly, as in the HE wastewater project, where a single vendor had the technology available, or may become involved afterwards. Much of this involvement is determined by federal procurement practices.

Area to consider: How is the action plan development system assessed and improved?

Every facet of action planning undergoes review. For instance, Appendix F measures are reviewed and updated annually. The ISM approach is reviewed frequently and updated as needed. New LIRs are written each year as regulations or DOE goals change. Feedback is



solicited on the ESH-ID process, and the elements of that program change to reflect both operating group and reviewer input.

2.3 Integration and Implementation

Steps 4 and 5 of ISM are the way that strategic and action plans are integrated and implemented. These steps are briefly described in Figure 2-3 for the HE wastewater example project.

Area to consider: How are action plans implemented, documented, and tracked for success?

Area to consider: How are the environmental results of the programs (both successes and failures) reported back to your organization to assure organizational learning, and how is the information used to improve the prevention-based environmental management system?

Before an action plan can be implemented, an HCP must be developed. All HCPs must identify work hazards (including environmental issues) and controls. Managers must sign HCPs, and only properly trained workers are authorized by the HCPs to do the work. The table of contents of one of ESA's HCPs is shown in Figure 2-4. Note that elements such as training and waste generation and disposal are addressed.

The success of action plan implementation is tracked a number of ways. Management walkarounds are an Appendix F-required management tool for line managers to ensure that work they have authorized is conducted as authorized. They must also know how well their organization performs relative to appropriate performance measures and requirements such as those specified in Appendix F of the DOE-UC contract and LPRs. In this program, managers get out into the field and walk their spaces, watching workers perform work authorized under HCPs. Walk-around is a web-accessible database for recording observations and tracking corrective actions. It is also used to trend and summarize the data. Observations that lead to actions, such as the issuance of awards or the resolution of deficiencies, are tracked. Issues that must be resolved at higher levels are passed up the chain of command using the database.

The Safety Concern Program (SCP) is a no-fault partnership between workers and managers at LANL to identify and resolve safety concerns. Workers electronically submit any environmental compliance or safety problem. The pertinent managers receive electronic notification of the safety concern and are responsible for resolving the problem. The submitter receives periodic updates as the concern is tracked to resolution and closure.

ESA's Quarterly Appendix F Self-assessment is another way that successful implementation of action plans is tracked. Non-compliance in the areas of waste management, air, water, or other tracked areas are reported and trended. The reasons for failure and the planned remedial steps are defined.

As described under this area to consider, each of these tracking mechanisms has a self-reporting aspect to assure that information is reported back to ESA and the Laboratory. This information is used to improve action plans as described under the next area to consider.



Area to consider: How are action plans modified to address continuous quality improvement?

As is shown in Figure 2-3, action plans are continuously re-evaluated in Step 5. If performance is not found to be adequate, the plan will require modification. The level of the modification will depend on the root cause of the problem, which could be at the level of strategic planning, action planning, or implementation. In the example shown in Figure 2-3, the root cause was in the implementation. However, if resolving the problem could change the environmental impacts, a new ESH-ID might be required, and the project would have to go back to action planning, as described in Item 2.2. If the root cause was that the whole strategic plan was flawed, the process would begin over in strategic planning, described in Item 2.1.

Area to consider: How are action plans communicated to the employees, the community, and the other interested parties, as appropriate?

The groups to which action plans are communicated are dependent on their impact. All action plans are communicated to the employees directly affected by them through the HCP process. Action plans are transmitted to DOE mainly through their success or failure by the Appendix F self-assessment process. Action plans are communicated to regulatory agencies through permits or require other regulatory notifications. Action plans are communicated to the public through public meetings, such as those called for in the SWEIS or through other public LANL forums, described in Chapter 1.

Area to consider: How are resources (financial and human) aligned to support environmental improvement efforts?

ESA aligns resources to support environmental improvement efforts through our more than \$13,000,000-per-year funding of supporting partners such as ESH Division. Another way resources are aligned to support environmental improvement efforts is through direct taxation of waste or charges for permits, such as the GSAF Program described in Items 0.1 and 2.1. ESA can directly solicit funding for environmental improvement efforts from DOE or from programmatic money held by the Laboratory to support environmental improvement efforts. To obtain this type of funding, ESA prepares a technical and cost proposal, much like the process described for the HE wastewater project in Items 2.1 and 2.2. ESA also provides direct funding for our environmental projects and to support the ESA-ES&H Team.

Area to consider: How are action plans linked to your organization's strategic planning process?

This question has been addressed in the previous sections of this Chapter.

*Area to consider? How is the environmental management system formally maintained and improved?
How is the environmental management system audited by either internal or external audits?*

The ISM system, including its environmental management components, is a Laboratory-wide system, maintained through Appendix F. The Appendix F and ISM processes of evaluation and improvement have been described previously. Audits are used extensively to assure performance. Given the nature of ESA's business, it is not surprising that the



division is one of the most strictly regulated and intensively audited organizations in the DOE complex. **In connection with our ES&H practices alone, we are bound by law or policy requirements to participate in no fewer than 68 formal audits per year.** ES&H audits are conducted by DOE (Washington), DOE (Albuquerque), DOE (Los Alamos), DNFSB, EPA, NMED, and nine separate internal LANL oversight bodies.

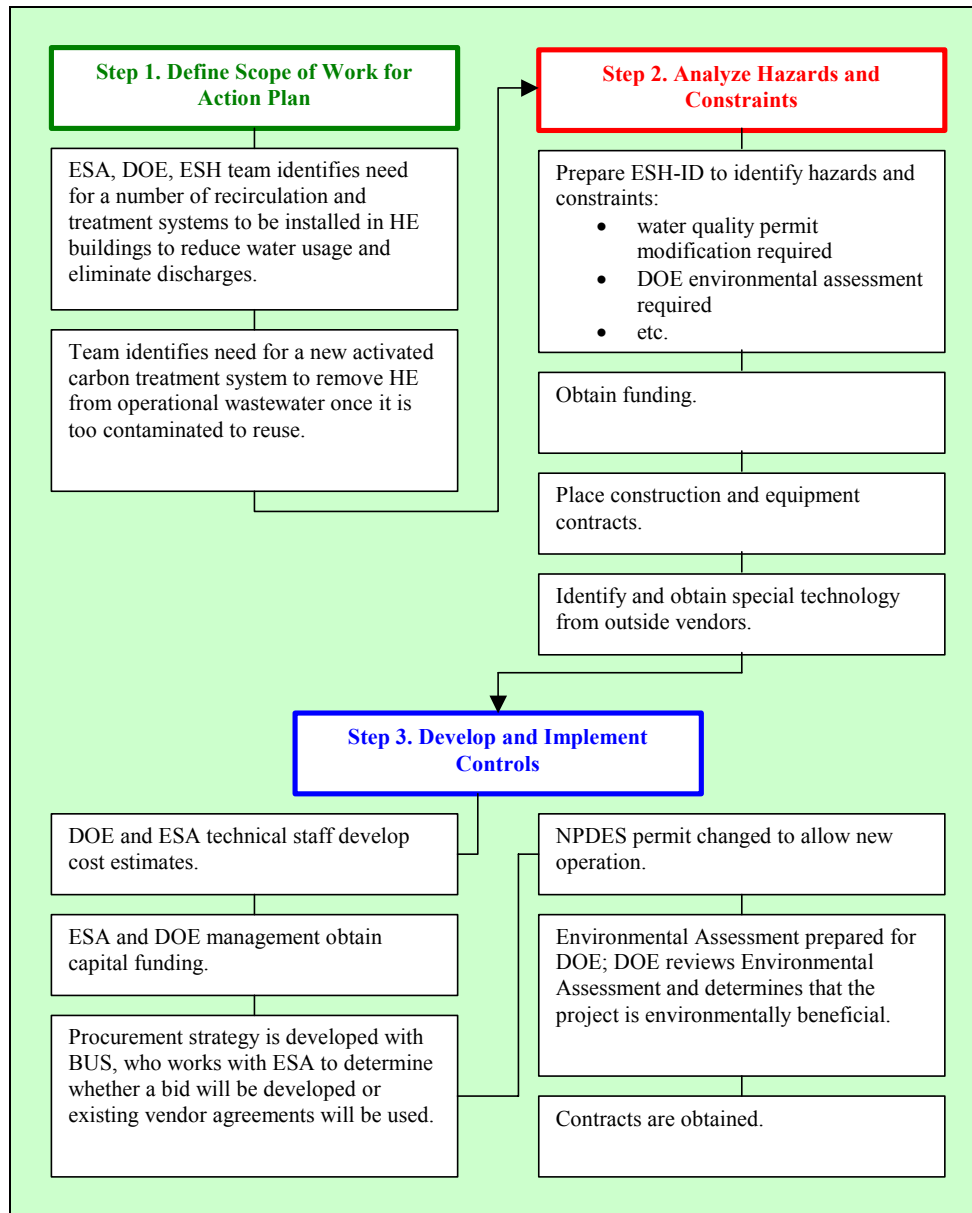


Figure 2-2. ISM steps in action planning.

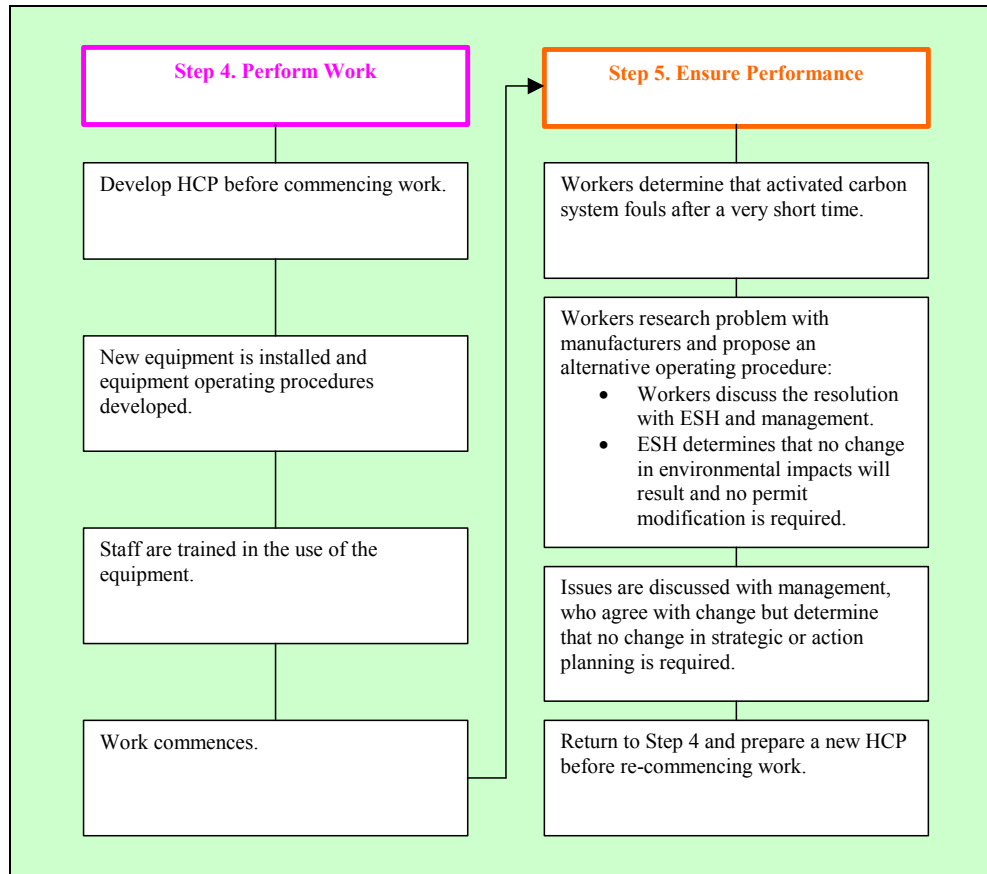


Figure 2-3. ISM steps in project integration and implementation.

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Figure 2-4. Example of an HCP table of contents.



3 Customer, Supplier, and Others Involvement

3.1 Customer Involvement

As described in Item 0.2, Appendix F of UC's operating contract is the way that LANL's main customer, DOE, is involved with defining environmental goals and how they measure progress against those goals. This chapter will describe how other customers/stakeholders such as the public, regulatory agencies, and suppliers are involved in the Appendix F process.

Area to consider: How does your organization communicate with customers regarding continuous environmental improvement and attempts to improve environmental performance to date? How does the organization assess customer needs and satisfaction regarding the environmental aspects of products, services, or processes?

Area to consider: How does your organization work with customers to exercise effective product stewardship by informing them of the elements of effective stewardship, partnering with them to encourage effective stewardship, and working with them to assess the life cycle of the materials (including yours) that are in their products.

Appendix F provides clear expectations, increased accountability, and improved customer relations by addressing performance issues that concern DOE, regulatory agencies, and the public. Table 3-1 shows a number of Appendix F functional areas especially relevant to this chapter, areas that primarily fall within the purview of our BUS Division partners. The negotiation steps for Appendix F measures, the process to set priorities, the improvement steps, and the resulting evaluations (see Figure 3-1) all help focus ESA Division resources on key business processes and improve operational quality. Appendix F requires an annual self-assessment and evaluation by both UC and DOE, but ESA Division senior leaders prepare a quarterly Appendix F Self-assessment to track current progress against goals and to identify any issues. It is this cycle that assures continuous environmental improvement.

Table 3-1. Appendix F measures of customer, supplier, and others involvement.

Functional Area	Measure	Focus
Finance Management	1.2.a	Customer satisfaction
Finance Management	2.1.a	Quality products/services
Procurement	1.1.a	Assessing system operations
Procurement	1.2.a	Effectiveness/best practices
Procurement	1.3.a	Supplier performance
Procurement	1.4.a	Socioeconomic subcontracting
Procurement	2.1.a	Customer satisfaction rating
Procurement	3.1.a	Employee satisfaction rating
Property	5.1.a	Aligning customer expectations

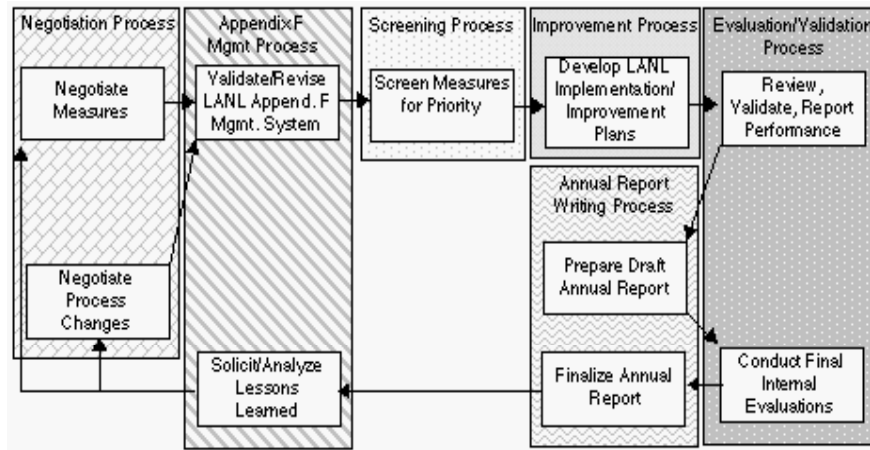


Figure 3-1. LANL Appendix F process (18-month continuous cycle).

ESA Division's customer focus approaches are based on the model shown in Figure 3-2, which follows the ISM strategic and action planning approach described in Chapter 2. Using the requirements and expectations data obtained by this model, the division can align its business plan with customer priorities. The model also helps the division take action to improve customer satisfaction and close the loop with the customer.

Area to consider: How does your organization support the pollution prevention or environmental improvement efforts of its customers.

Area to consider: How does your organization develop new markets and increase its customer base by converting wastes to products through onsite product development; working with other companies that convert waste to useful products; participating in feasibility studies; or by working with universities to enter into collaborative research projects to find ways to make products from waste?

Appendix F contains specific measures for P2 and expectations for environmental improvements. The Appendix F measures, the metrics used to measure them, and customer satisfaction ratings for P2E2 and environmental improvement are included in Chapter 7. Also included in Chapter 7 are specific examples of how ESA has contributed to achieving these measures.

Item 0.1 describe how ESA and BUS Division work with vendors to develop new suppliers. The Laboratory's Technology Transfer Program (see Items 1.2, 3.1, and 7.2) and numerous community-leadership initiatives (see Item 1.2) actively develop new markets for LANL expertise. Chapter 2 describes how action planning is performed to implement strategic plans, including the Appendix F measures for pollution prevention. During action planning, the need to partner with waste reducing companies is identified. ESA may use either vendors already approved by BUS, for instance for metal recycling, or may actively seek a new vendor with special skills. See Item 7.2 for specific examples.

Area to consider: How does your organization market its "green" products, process or services (through advertisements, web pages, etc.) to increase potential customers and markets?

LANL is able to market "green" opportunities by developing relationships with "green" vendors, as described in Chapters 0 and 1. This is largely a function of our BUS Division's efforts; their programs and web sites are described in those chapters. Chapter 1



also references the Laboratory's technology transfer web site, which includes ESA's "green" products such as fuel cell research.

3.2 Supplier Involvement

Area to consider: How are suppliers, contractors, and vendors involved in the development and improvement of products, services, and processes as part of your environmental improvement program?

Area to consider: How does your organization evaluate suppliers, contractors, and vendors for their environmental performance and commitment to effective energy management?

Specific supplier requirements are defined for each supplier in a customized contract that is negotiated, implemented, managed, and evaluated by BUS procurement personnel. When data suggests that a change to the supplier's process be made, BUS Division provides a team to work with the supplier to improve its process using the plan-do-check-act (PDCA) principle. BUS Division is also responsible for evaluating the overall performance of suppliers, as specified in Appendix F. Figure 3-3 shows the LANL contracting process. This process must meet Appendix F requirements for Green Purchasing, as described in previous chapters.

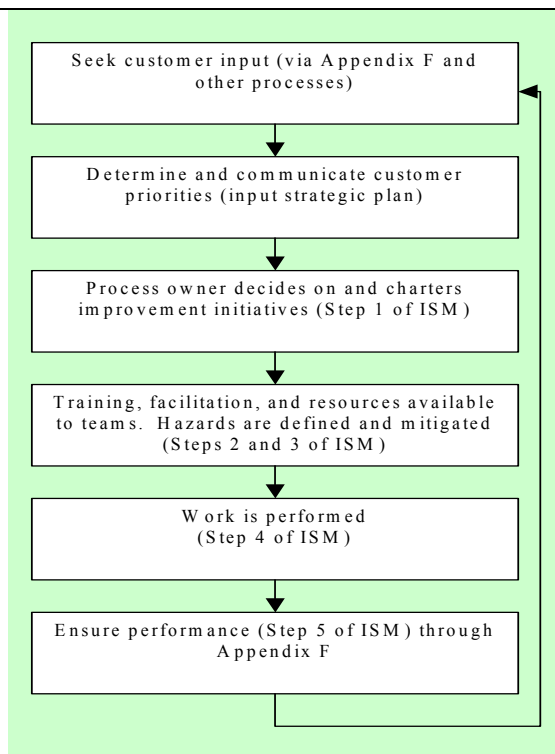


Figure 3-2. ESA Division's customer satisfaction model.

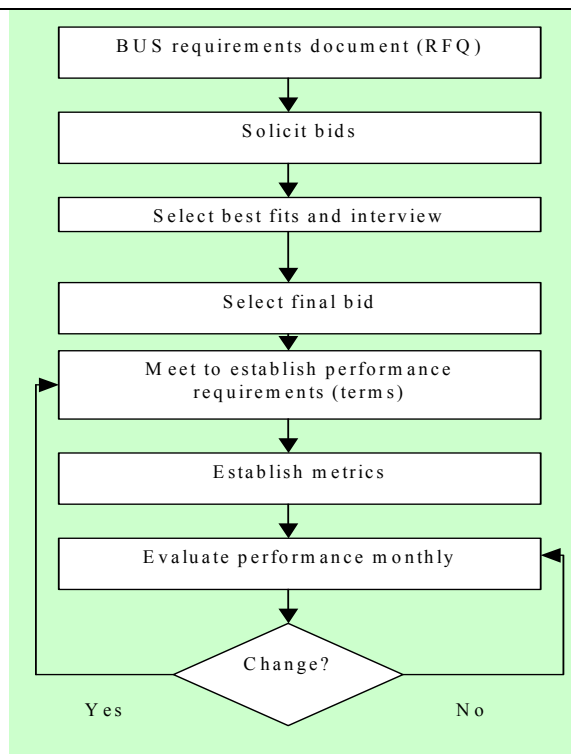


Figure 3-3. The supplier management process.

Within its limited sphere of interaction with suppliers, ESA Division does, however, employ several environmental considerations. For example, the division purchases "green" products, as described in Chapters 0 and 1. The division also ensures that all new computers are equipped with Energy Star, an energy saver function that turns off the



monitor's screen when the computer is not in use. The division is making a determined effort to ensure that purchased office products, including paper, contain recycled content. To minimize the use of paper, printers and copiers are set to automatically print double-sided, and new equipment will be required to have that capability. The use of electronic messaging and a comprehensive web site also promote the minimization of paper usage. The division promotes saving of wastes and expense associated with unnecessary travel by championing teleconferencing and distance learning. See Items 7.1 and 7.2 for ESA-specific examples of supplier and vendor involvement.

3.3 Others Involvement

Area to consider: How does your organization work with environmental, health, and safety oversight agencies to manage compliance in a mutually beneficial fashion?

Area to consider: How does your organization work with oversight agencies and other interested parties to develop regulations and compliance approaches to improve overall environmental results and to incorporate prevention-first philosophies.

ESH Division coordinates all direct contact with ES&H oversight agencies. ESA Division supports ESH Division in preparing permit applications, meeting with regulatory agencies to provide technical input, and assisting ESH Division in conducting regulatory agency audits. ESH Division does have a close relationship with regulatory agencies to manage compliance. For instance, ESA's water and hazardous waste groups meet periodically (usually monthly) with NMED to track progress on projects. Other ESH groups meet with regulatory agencies on an as-needed basis. ESH Division and NMED hold joint public meetings to provide new information. ESH Division provides funding to NMED for studies like the dose reconstruction project. DOE provides funding to NMED to staff an office in Los Alamos with oversight personnel.

ESH and ESA Divisions also participate in the development of regulations, as regulatory agencies allow. When invited, ESA and ESH staff members also participate in trust-and-partnering activities to develop regulations. For instance, members of the ESA-ESH Team participated both on DOE's national beryllium standard and on NMED's air quality regulatory review program. When not invited to participate in developing proposed regulations, LANL and ESA Division participate in a process to comment on regulations that affect them and participate in public hearings to represent the Laboratory.

Area to consider: How does your organization communicate continuous environmental improvement goals and action plans to interested parties to gain feedback, support, and buy-in?

Area to consider: How does your organization provide an annual third party, independent evaluation of success made in the continuous environmental improvement program, and how are the results communicated to interested parties?

Appendix F reports are the primary way that LANL communicates continuous environmental improvement goals to interested parties and receives feedback. This process has already been extensively described throughout this application. This process is subject to significant third-party audits that provide independent evaluation of success. See Item 2.3. We will also consider the evaluation to be provided by the Green Zia Examiners as an opportunity to receive third-party, independent assessment of our continuous environmental improvement program and its results. Reports are prepared and



distributed internally for all audits. Regulatory audit results and other continuous environmental improvement project data are published in LANL's annual Environmental Surveillance Report and distributed to the public and other interested parties.

LANL has a graded, systematic approach for reporting data and other activities. Routine monitoring data is reported in the annual Environmental Surveillance Report, described above. In the event of an accidental spill, any levels exceeding regulatory reporting limits are reported through ESH Division to EPA or NMED. Each division, including ESA, develops an emergency response plan, which describes to whom and in what time frame information is reported.

If an off-normal event occurs at ESA, ESA participates directly in the DOE Occurrence Reporting and Processing System investigation. A root cause is identified for each occurrence, responsibilities assigned, and remedial measures defined. These occurrence reports are available to the public and to regulatory agencies at <http://drambuie.lanl.gov/~esh7/Finals/> and in LANL's public reading rooms.

4 Information and Analysis

4.1 Information Collection and Management

Area to consider: How does your organization calculate raw material input, material flow, and non-product outputs (wastes) from processes to measure resource use efficiency and environmental losses?

Materials to be used in processes and wastes generated are addressed by the processes described in Chapter 2—the SWEIS, the ESH-ID, and the five-step action planning process.

Area to consider: How does your organization determine environment, health, and safety requirements and other aspects associated with a product, service or production process (for example, customer specifications, military specification, inventory) that may affect environmental performance or operations?

New processes or existing processes using new materials may require detailed examination using the NEPA screening tools or the ESH-ID process. A new HCP may be required if the process or material hazards have not already been examined and appropriate controls put in place. Modification and maintenance of facilities always require two ES&H reviews, by the work-control team and the support services subcontractor (Johnson Controls of Northern New Mexico), as shown in Figure 6-1 and discussed in Item 6.1.

Area to consider: How does your organization use its accounting system to understand the true cost of a product, service, or production process?

Because LANL is not a production facility, true cost is not a factor that is tracked. Rather, Appendix F is used to determine whether the customer is satisfied with productivity, the cost, and the product (see Item 2.1).



Area to consider: How does your organization determine the environmental or other related impacts of a product, service, or production process through its life (life-cycle analysis/life-cycle impacts)?

Life-cycle planning affects all facets of planning at LANL. Specific LIRs and LPRs that address life-cycle planning include the LANL Comprehensive Site Planning Program, Construction Project Management Program, Project Management for the Acquisition of Capital Assets, Managing Facility Assets, Facility Configuration Management, and Managing Radioactive Waste. These documents require that projects analyze energy, waste disposal and reduction, environmental impacts from construction, and eventual facility decontamination and decommissioning life-cycle impacts.

Area to consider: How does your organization use information to document organization-wide environmental activities?

ESA's Appendix F Quarterly Self-assessment is the primary way that ESA documents environmental activities. Input to this report comes to ESA from a variety of sources. Such information includes data on waste disposal, radiation exposures, internal laboratory audits, external audits by organizations like NMED, DOE-wide occurrences, the ACIS (Automated Chemical Inventory System) chemical database, internal Laboratory occurrences and lessons-learned, manager and employee walkarounds, regulatory requirements, and DOE orders. Regulatory requirements and DOE orders often require formal documentation of activities. Walkaround data are managed in a Laboratory database accessible by managers and employees and can be sorted on a variety of fields. DOE-wide occurrences are sent to managers as a pamphlet. Results of both internal and external audits are entered into an action database for which action plans, milestones and dates are required. Waste disposal information is tracked by FWO-SWO and is a major driver in the ESA waste reduction activities. Finally, the chemical inventory database has been instrumental in the reduction in harmful chemicals (carcinogenic, highly toxic, etc.) in the workplace.

Area to consider: How is competitor analysis on green trends tracked and considered in product design?

Item 0.4 describes how Appendix F is used to standardize DOE green requirements among LANL's "competitors" for DOE funding.

4.2 Analysis and Decision-making

Area to consider: How does your organization analyze information to prioritize areas for improvement?

Legally we are required to conform with all regulations and DOE orders, so these have a high priority. Any findings from audits (external or internal) that are not disputed must be addressed as a high-priority. See Item 6.1 for information on risk management. Data from many of the sources cited above are used in the formulation of the hazards and controls. For example, chemical compatibility must be considered when using multiple chemicals or when using a cleaning agent with HE. Items 2.1 and 2.2 have described how information is used in strategic and action planning.



Area to consider: How does your organization use information related to action plan development, deployment, and results to identify organization-wide areas for improvement (waste reduction, toxicity reduction, productivity improvements, risk reduction, reduced liability, cost savings, or other performance measures)?

Planning documents take many forms in the Laboratory and ESA, including the Appendix F measures, the survey of activities mandated by Laboratory requirements, HCPs, facility safety plans (FSPs), authorization basis (AB) documents, etc. As a result these documents are compiled across the division, and common needs and concerns arise from them. When a concern is common to many parts of the organization, ESA may choose to address it from a division-wide view. As stated above, the HCPs detail the hazards and associated controls. These are reviewed and revised at least annually. Items 2.1 and 2.2 describe how strategic planning and action plans are integrated to identify areas for improvement.

Area to consider: How does your organization use comparative information to assess and improve the environmental performance of production processes, services or product design as part of the prevention-based environmental management system?

Area to consider: How does your organization use comparative information to set strategic directions for continuous environmental improvement, improve overall organization performance, and improve the prevention-based environmental management system (best practices, best of class goals, benchmarking, sharing of successes)?

Area to consider: How does your organization evaluate competitors and market trends in the formulation of its environmental strategies?

Appendix F reporting compares environmental and safety performance against specific prevention-based environmental performance goals. LANL's performance is measured against our primary competitors for DOE funding. The various measures and ESA's performance are described in Chapters 5 and 7. Item 2.3 describes how the comparative information is integrated into strategic planning, as well as action planning to improve the environmental performance of specific projects/products. The ways that the Appendix F requirements for green trends are incorporated into project/product design have already been described throughout previous chapters of this application. Item 2.1 describes how Appendix F measures are used to set strategic direction for environmental improvement.

5 Employee Involvement

5.1 Employee Education and Skill Development

Area to consider: How are employees' skills assessed, and how are education and training needs determined and aligned to the continuous environmental improvement approach?

Training is specifically covered by a LIR, Laboratory Training: A Graded and Systematic Approach to a Qualified Workforce. Employees fill out a questionnaire regarding the types of work they do. General training needs are identified by how these questions are answered (e.g., workers who use chemicals are required to take specific chemical safety,



waste generator, etc. training). Many other LIRs also have specific training requirements, largely regulatory requirements. Supervisors must determine whether workers need any other job-specific training. The workers and supervisors then prepare an HCP. Figure 2-4 shows a table of contents for one ESA HCP; note that training is specifically addressed in the HCP. The worker's supervisor assesses the worker's job skills and training. If these are adequate, the worker is authorized to work under the HCP.

LANL's Performance Management System (Figure 5-1) requires ESA Division to establish objectives that support the organizational goals. Objectives for each employee are then designed to ensure that the goals are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization.

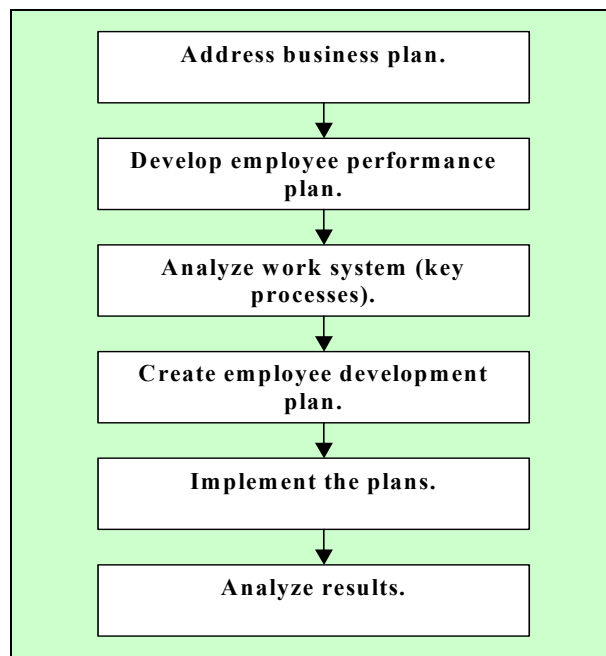


Figure 5-1. ESA's Performance Management System.

As part of performance management, managers work with each employee to cooperatively prepare individual development programs—both short-term and long-term—on an annual basis. As employees and their managers work together to identify how they will contribute to group plans, they identify the need for new skills and competencies and jointly develop a growth plan. It is then up to managers to supply the resources to enable and encourage the employee to accomplish the development plan. Once developmental goals have been established, employees may participate in appropriate training offered by LANL or other organizations. ESH Division offers over forty courses related to environmental issues, from general safety training and first aid to courses on such specific topics as packaging and transporting hazardous materials.



Area to consider: How does your organization's employee training program promote employee input to improve environmental and energy performance beyond compliance with regulatory requirements through creative thinking, problem solving, knowledge of new technologies, and other skills?

All employees are trained on the five-step process, and their supervisors are trained in the development of HCPs. A key step in both of these processes is the hazard identification and control, which includes environmental and energy hazards. Personnel who use chemicals or generate waste receive specific training that covers all aspects of P2, from substitution to recycling. The training reinforces the LANL five-step process, which encourages creative thinking and novel approaches. This quality process has a feedback mechanism as the final step so that improvements feed directly back into the system. New approaches and ideas are examined for compliance, safety, enhancing the existing process, and resource sensitivity. If these are met, the process can be modified and the new approaches implemented.

Area to consider: How does your organization increase employees' awareness of compliance issues to improve compliance performance?

Twice a month the division managers are presented information on the ES&H performance and any associated problems. This information can then be taken to the employees. ES&H Team personnel routinely give talks at various group meetings. The division ES&H committee, composed of managers, meets monthly to discuss all ES&H issues. The S-site Safety Committee, composed of employees, meets monthly to discuss concerns, primarily over HE. The quarterly performance by the division, including Appendix F measures, is posted on the web and is available to all employees.

Area to consider: How does your organization's training program encourage employees to share and disseminate the ethic of environmental excellence and effective energy management at home, in their schools and in their community?

One of the Laboratory's six zeros is that there will be no accidents onsite as well as offsite. The same can be said of environmental incidents. The Laboratory encourages employees to be as good citizens of their communities as they are required to be of the Laboratory. Hopefully, employees will carry the environmental and safety ethic required at the Laboratory outside the Laboratory.

Area to consider: How is the organization's environmental training program assessed and improved?

LANL's training organization, ESH-13, is assessed by audits, much the way ESA's performance is audited (see Item 2.3). Also, each worker receiving training evaluates the course. ESH-13 modifies training in accordance with audit results and worker evaluations. In addition, they develop training for new regulatory requirements and receive feedback from the support and operating groups on the content of the training.



5.2 Employee Involvement

Area to consider: How are employees involved in product, service and process design for continuous environmental improvement and effective energy management?

Area to consider: How are employees involved in the development of action plans, and how are human resources aligned to implement action plans?

Employees are responsible for developing the HCPs and the five-step process to design action plans (see Item 2.2). These plans and documents identify the process steps, the safety issues, and the environmental hazards. These are reviewed at least annually and updated with any changes. At any time, but particularly during the annual review process, process changes are encouraged that improve the safety and environmental performance. These changes are incorporated into the process and become the new standard to be followed.

Area to consider: How does your organization provide encourage and support (through facilitation, etc) broad employee involvement in continuous environmental improvement efforts?

To encourage communication, all managers observe an open-door policy. Employees may also provide comments and observations at group meetings. The annual Employee Checkpoint Survey and the Upward Appraisal Program provide ways for employees to give anonymous input (see Item 5.3). Employees may also discuss issues with the ESA-Facilities Manager (FM), ES&H specialists, or the waste coordinators. ESO has also established an electronic mechanism for soliciting employee input on P2. Employees can send comments, observations, or questions to wastenot@lanl.gov. The message will be routed to the environmental specialist best able to respond, the sender will be notified of any proposed action, and ESO will track the issue to resolution.

Area to consider: How does your organization ensure that employees are up-to-date in your organization's successes relative to continuous environmental improvement goals?

As stated in Item 5.1, the ES&H Team and division managers meet monthly to review information that should be conveyed to employees. An S-site (TA-16) Safety Committee, composed of employees, also meets monthly. Quarterly performance evaluations are posted on the web.

Area to consider: How does your organization encourage employee participation, as part of work duties, to address specific community environmental issues such as air quality, water, or other issues (car pooling, telecommuting during Air Quality non-attainment days, water conservation during droughts, etc)?

One key process by which division employees actively address community environmental issues is through coordinated volunteer efforts. The LANL Community Involvement and Outreach Office (CIO) is the focal point for such activities, many of which address environmental issues. Highlights from the 1999 CIO report include the following

- The LANL Foundation awarded more than \$2,700,000 to community and educational institutions.



- The Laboratory had in place 23 science education programs that directly affected more than 1,700 students and teachers, representing total outlays of \$4,400,000 in DOE funds.
- The Laboratory has greatly increased regional procurement. Regional procurement in FY 1999 was up 84 percent over FY 1996.
- Fifty-seven “Voice of the Customer” meetings with community leaders were held.
- The Laboratory continued to develop employees as volunteers, an approach that has become a service valued by both the community and the employees.
- The Laboratory held several meetings to brief tribal leaders and tribal environmental staff members on ES&H issues including HE residues in water and planning for emergency response situations.

Interested employees receive e-mails regarding volunteer opportunities on a regular basis.

5.3 Employee Satisfaction, Value, and Well-being

Area to consider: How does the organization consider the “inside work environment” (employee health and safety concerns) equally with the “outside environment” (traditional environmental concerns) when designing work areas or making process improvement decisions?

As described in Chapter 2, an ESH-ID or other NEPA screening is prepared for new and modified processes. The ID provides ESH and other divisions with the opportunity to provide input on environmental concerns and constraints, including P2E2. In addition to the ESH-ID process, ESA facilities must produce several operations plans required by LIRs to address safety and environmental requirements. These include facility management plans, configuration management plans, FSPs, quality assurance plans, emergency action plans, training program description and job analysis, and maintenance implementation plans. These represent a process to ensure that high-quality work being conducted on hazardous materials is accomplished with minimal risk to the worker, peers, surrounding communities, and the environment.

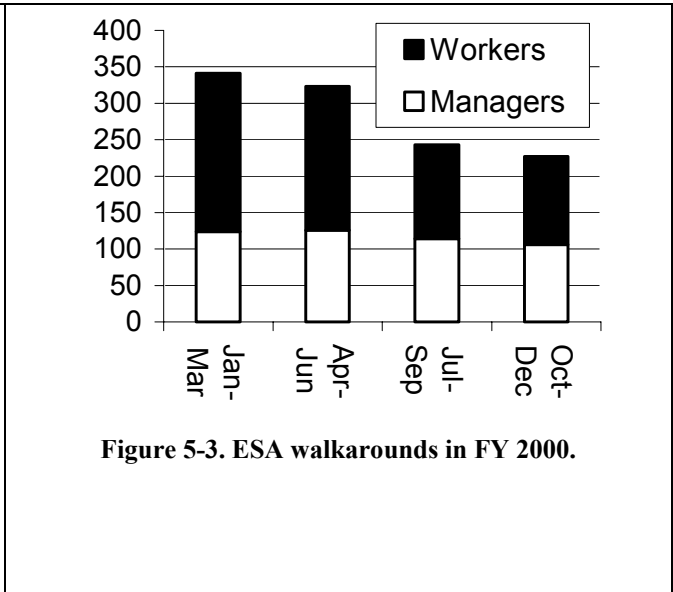
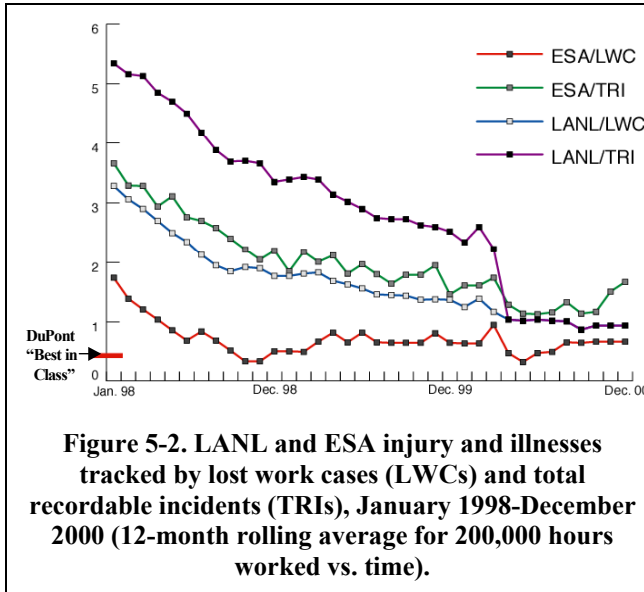
ESA Division's efforts to impact the environmental and safety culture of the surrounding communities begin with the Laboratory Director's "Six Zeros." One of the goals is to have zero injuries or accidents off the job. Thus, employees are expected to translate the LANL safety culture to their own homes and families. Figure 5-2 below shows how ESA injury/illness statistics compare with those for the Laboratory. During 1999, ESA paced LANL, with Laboratory-wide results during 2000 generally trending toward Best-in-Class.

Ergonomics has been a major contributor to the injury statistics of the division. ESA has focused efforts on the design of work areas as well as the work habits of employees. A full time person is dedicated to these ergonomic problems.

The ISM program requires managers to conduct monthly walkarounds in their areas, looking for and correcting ergonomic concerns, work area hazards, and environmental issues. Other personnel are encouraged to conduct walkarounds, more than doubling the results. The ISM database tracks deficiencies identified during walkarounds until the deficiencies are resolved and compiles the deficiencies to identify and improve safety



performance. Figure 5-3 shows the numbers of manager and employee safety walkarounds at ESA. Managers are required to accomplish all of their expected walkarounds; last year ESA leaders completed and documented more walkarounds than required.



Area to consider: How does the organization gather input from employees on the work environment as it pertains to environmental issues?

LANL's major formal method for determining employee attitudes and the climate in the workplace is the annual Employee Checkpoint Survey (see Figures 5-4 and 5-7 through 5-10). The survey contains standard types of questions in general categories including safety, productivity, and customer focus. A second major method is LANL's annual Upward Appraisal Program (see Figure 5-5), which allows employees to provide direct feedback to managers regarding the supervisors' behavior and ability in areas such as ES&H; communication; and accountability. Division managers review the information from these instruments and use it to help establish goals and corrective actions (see Figure 5-6).

Note: Neither the Employee Checkpoint Survey nor the Upward Appraisal was conducted in 2000 because of the Cerro Grande Fire emergency. These assessments will again be conducted in 2001.

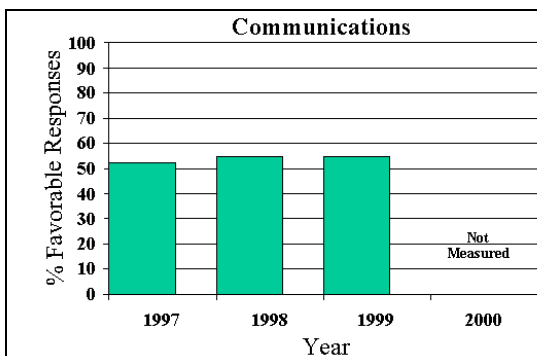


Figure 5-4. ESA's Employee Checkpoint score for communications.

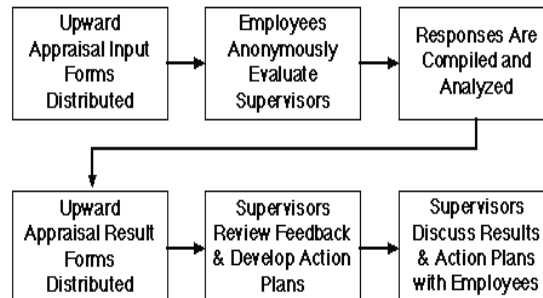


Figure 5-5. LANL's Upward Appraisal Process.

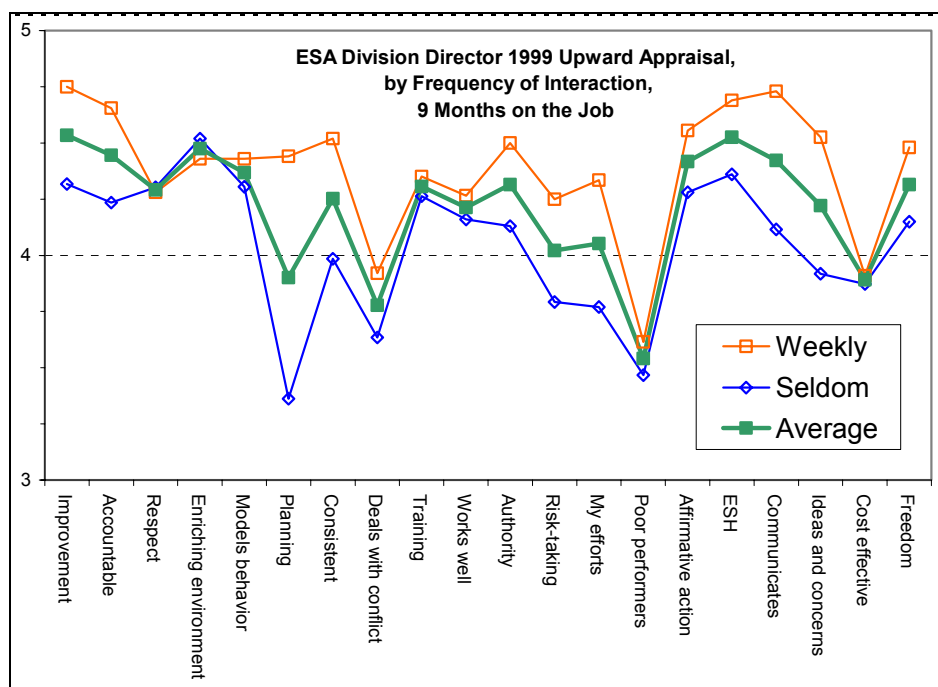


Figure 5-6. Upward Appraisal scores for the ESA division director.

Employees may enter and track their own safety issues through LANL's web-based SCP. Managers monitor employee input into SCP to determine the type of safety concerns employees have and also to ensure issues are tracked to resolution. This is a no-fault system and requires management to respond and address any safety question entered by an employee. Employees can choose to be identified or remain anonymous.

Area to consider: How does your organization provide incentives to motivate and reward employee participation in the organization's environmental improvement program (awareness programs, monetary incentives, rewards, bonuses)?

There are incentives to encourage staff to work smarter and utilize innovative approaches to accomplish their work. The P2 Awards Program, sponsored by ESO, is open to all employees and subcontractors. It is designed to encourage individuals and teams to



develop P2E2 plans or programs. Recipients of the awards receive recognition and a cash grant from specially allocated congressional funds. The Los Alamos Awards Program, administered by LANL institutionally but tailored for application at the division or program level, provides a link between the organization's mission and those employees or teams that achieve significant accomplishments toward that mission. ESA managers use the program to recognize exceptional contributions and noteworthy achievements by awarding their employees, either individually or as teams, cash awards ranging from \$250 to \$2000.

Area to consider: How does the organization assist employees in dealing with life issues that can impact their ability to work (wellness programs, employee assistance programs, flex-time)?

As part of the larger LANL community, ESA relies primarily on institutional programs to enhance employee support. LANL offers a comprehensive set of support initiatives along with feedback systems. Group employees are encouraged to use all LANL services that are appropriate and relevant to their individual needs, including

- the LANL Employee Assistance Program, to provide quality-of-life support
- the LANL Wellness Center, to provide comprehensive fitness and life-style services
- alternative workweek schedules, to accommodate diverse personal needs
- formal and informal grievance procedures, to address discrimination, harassment, and interpersonal-skills issues
- an Ombuds Office and Mediation Center, to provide structured approaches in conflict resolution.

Area to consider: How does the organization assess employee satisfaction with its environmental improvement program? How is this information used to improve employee involvement in the environmental improvement program?

Figures 5-4 and 5-7 through 5-10 show selected ESA scores from the annual Employee Checkpoint Survey. These annual measures provide ESA managers with direct input on employee concerns related to environmental and associated workplace issues. Consideration of Employee Checkpoint Survey scores is mandated in the formulation of the division business plan.

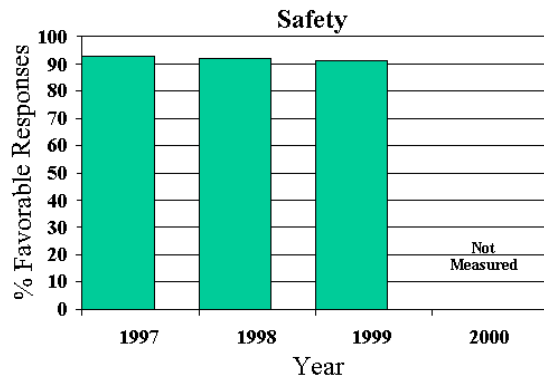


Figure 5-7. ESA's Employee Checkpoint scores for safety.



Figure 5-8. ESA's Employee Checkpoint scores for job satisfaction.

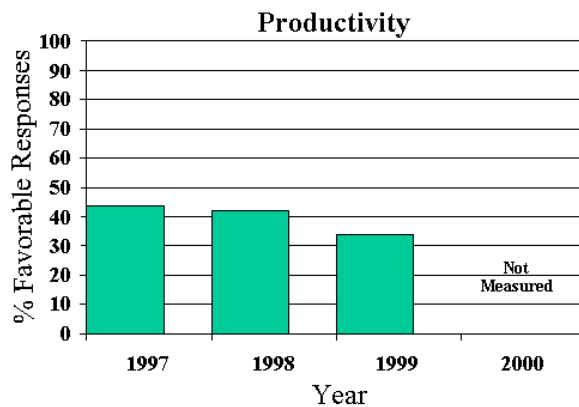


Figure 5-9. ESA's Employee Checkpoint scores for productivity.

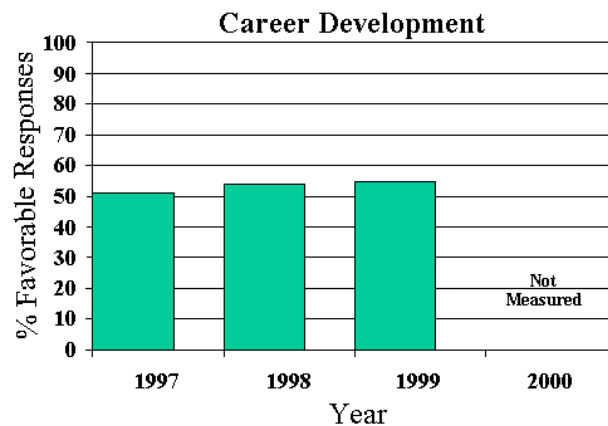


Figure 5-10. ESA's Employee Checkpoint scores for career development.

6 Process Management

6.1 Process Characterization and Control

Area to consider: How does your organization conduct process analysis of all pertinent processes to identify environmental issues, and how does this analysis become part of daily operations?

Area to consider: How does your organization involve employees, customers and suppliers in process analysis?

As discussed in Chapter 2, ESA uses the five-step process in strategic and action planning to identify environmental issues. These issues, and their resolution, become part of daily operations through the HCP process, which govern work at ESA and the Laboratory. ESA managers use the wide variety of data, including data from customers,



employees, and operational reviews, to assess the performance of key processes. Representatives of funding organizations are involved in process evaluations through their input into the quality and usability of the final product. Employees provide operational evaluations through the development and revision of HCPs and the Facility Work Control Processes. Both DOE and UC stakeholders are active participants in establishing performance expectations and in evaluating operational achievement through the Appendix F process and approval of AB documents.

Area to consider: How does your organization use its environmental management system to manage processes in day-to-day operations to promote pollution prevention, assure compliance with environmental and health and safety regulations, and meet corporate environmental, health and safety compliance goals?

Area to consider: How does your organization conduct process analysis of corrective actions or other non-operational problem areas to identify environmental issues?

HCPs are generated for all activities, from office-type work through handling and using radioactive materials and explosives. In general, these plans are generated by employees (those most familiar with the work to be performed and the controls required) and reviewed and approved by management. These plans constitute the AB for performing the work and must include the following:

- a description of the work covered by the plan, with sufficient detail for the reader to understand the hazards and the controls;
- identification and systematic evaluation of the significant hazards;
- a description of controls to achieve acceptable risk;
- knowledge, skills, and abilities necessary to use the controls and to perform the work safely;
- wastes, or residual materials, produced and how they must be handled;
- an estimate of the work's residual risk with the control system in place;
- a description of emergency actions to be taken in the event of control failure or abnormal operation;
- a change-control process for modifying the HCP and notifying affected people.

Approval of an HCP documents acceptance of the residual risk for the work, with the described controls in place, and constitutes authorization of the work.

Existing HCPs must be reviewed for adequacy and currency on or before the next authorization review date specified on the cover sheet. Independent peer(s) and/or subject-matter expert(s) must review changes in the hazard control system. Changes and reviews must be documented, and the next review date established. See Item 2.3 for more information on risk-management practices incorporated into HCPs.



The ESA Division Facility Work Control Process is designed to implement the Laboratory Facility Work Control Requirements listed in LIR 230-03-01. The ESA implementation is available on the web at <http://www.esa-fm.esa.lanl.gov/workcontrol/fm-workcontrol.htm>. Figure 6-1 summarizes the process. This process is designed to

- involve the personnel at the location where the work is to be done (steps 2, 3, 7, 12);
- ensure that ES&H concerns are addressed (steps 4, 6, 11);
- provide quality assurance checks that the work is done properly (steps 5, 8, 9, 14, 15);
- provide feedback to improve the process (steps 14 and 15 feeding into step 1).

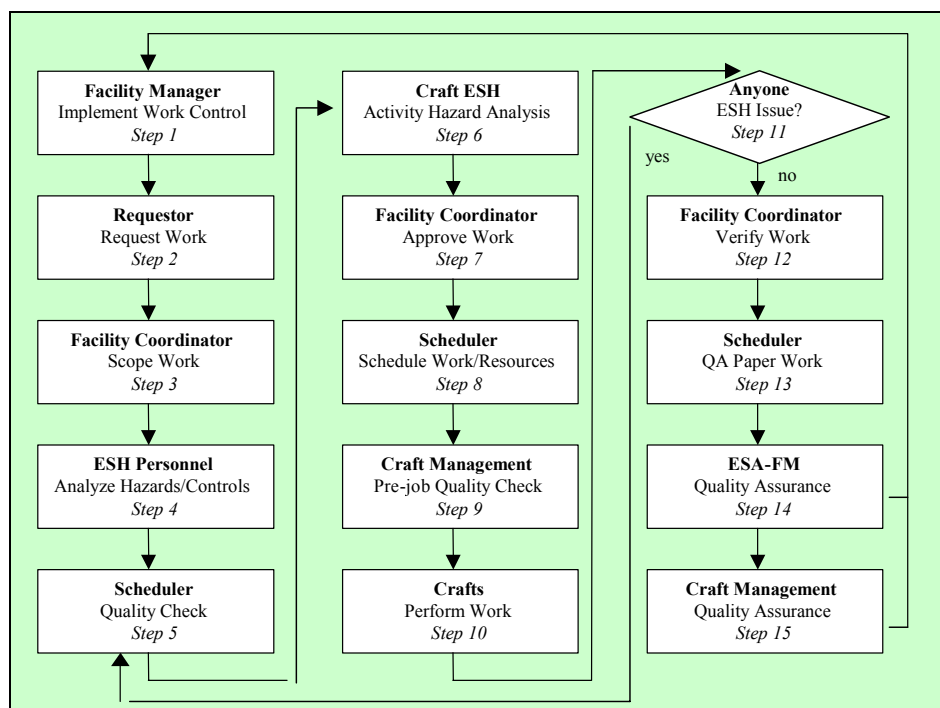


Figure 6-1. The ESA Facility Work Control Process.

Area to consider: How does your organization operate processes to reduce the potential for failure or losses+ and maintain efficiency?

Area to consider: How does your organization conduct process analysis of corrective actions or other non-operational problem areas to identify environmental issues?

The AB must be documented as part of the FSP and reviewed and updated as part of the annual FSP review. The authorizing individual(s) approve all revisions in the AB. When DOE and the Laboratory jointly authorize operation of a facility, the owning division director works closely with the DOE's authorizing individual during development and maintenance of the AB to ensure mutual understanding and agreement. Agreement between the Laboratory and DOE regarding acceptance of the AB, along with its controls



and implicit residual risks, is documented in an authorization agreement (LIR 240-01-03, Authorization Agreements). See Tables 6-1 and 6-2.

Table 6-1. AB requirements for non-nuclear facilities.

	High	Moderate/DOE Approval	Moderate/LANL Approval	Low
Authorization Authority	DOE Contracting Officer and Laboratory Owning Division Director	DOE Contracting Officer and Laboratory Owning Division Director	Laboratory Owning Division Director	Laboratory Owning Division Director
AB	Facility Safety Analysis	Graded Facility Safety Analysis	Graded Facility Safety Analysis	Facility Safety Plan until revised
Readiness Verification	DOE Readiness Assessment	DOE Readiness Assessment	Laboratory Readiness Assessment	Laboratory Readiness Assessment
Change Control	Change Control per 29 CFR1910.119	Change Control per 29 CFR1910.119	Change Control per 29 CFR1910.119	Facility Safety Plan until revised
Configuration Management	LIR 240-02-01	LIR 240-02-01	LIR 240-02-01	LIR 240-02-01

NOTE: For explosives facilities, some of the requirements may be superseded by requirements in DOE Order 440.1, "Explosives Safety Manual."

Table 6-2. AB requirements for nuclear facilities.

AB Document	AB Requirement	DOE Orders
Safety Analysis Report (SAR)	Required for nuclear facilities unless excepted below.	Order 5480.23 Standard 3009-94.
Basis for Interim Operation (BIO)	Used when a SAR cannot be developed as an interim operating document.	Order 5480.23 Standard 3009-94 Standard 3011-94
Justification for Continued Operation (JCO)	Used when there is no current SAR or BIO with TSRs, until development of a BIO or SAR.	negotiated with DOE
Technical Safety Requirements (TSRs)	Required for nuclear facilities.	Order 5480.22.
Unreviewed Safety Question (USQ) Program	Facility change control integrated with document control. The AB is maintained through the use of USQ program.	Order 5480.21.

FSPs incorporate the philosophies and guidance of DOE Order 5480.19, Conduct of Operations, and address

- analyses of facility hazards and facility hazard categorization;
- authorization authority for facility;
- definition of the safety envelope;
- implementation of the facility work-control process;
- means for identifying changes in activities and/or facility conditions;



- requirements for training and/or qualifications of key positions;
- start-up/restart requirements.

ESA Division Facility Safety Plans are available on the web at http://www.esa-do.esa.lanl.gov/FSP/ESA_FSP.html.

Area to consider: How does your organization improve its process analysis system?

These processes are revised and improved at both the Laboratory level and at the ESA Division level. Revisions are made in the Laboratory requirements that mandate changes to the procedures during an annual review process. Changes to any process or procedure can be suggested by any employee and will be reviewed at the appropriate management level. If the change is appropriate, **it will be included immediately if an ES&H matter is involved** or during the normal annual update. The change control processes contained in the AB documents are used for making facility changes, with the rigor increasing as the level of the hazard increases.

ESA hopes that participation in the Green Zia Environmental Excellence Program will continue the focus on ways to reduce waste generation and resource consumption in division processes. This focus will produce specific, measurable results for actions designed to reduce waste, to lower consumption of resources, and to increase operational efficiency.

6.2 Process Improvement

Area to consider: How does your organization systematically prioritize areas for continuous environmental improvement of pertinent processes, and how does improvement become part of daily operations?

Chapter 2 describes how action planning and strategic planning are integrated to prioritize areas for continuous improvement on an ESA project basis. Appendix F is the means used to prioritize areas for continuous improvement on the Laboratory scale.

As is seen in Chapter 7, areas of high waste generation or cost or environmental liability have been addressed to drastically reduce or eliminate these wastes. Improvements made in processes become part of the HCPs and associated SOPs that must be followed by employees. Integration of environmental improvement into daily operations has already been discussed in Item 6.1.

Area to consider: How does your organization develop action plans to improve processes?

A major part of the action planning process (see Item 2.2) is part of the normal review and revision of the above procedures. In case of an emergency, the situation is addressed and the paper work will follow. In business planning, actions are prioritized, funding and resources are determined, and resources allocated until they run out. Action plans are generated using project management tools with appropriate milestones and dates.



Area to consider: How does your organization involve employees, customers, and suppliers to identify and implement process improvements?

As noted in Item 6.1, employees are involved in all aspects of process definition and improvement. They originate most of the HCPs and provide most of the modifications. In nuclear facilities, they are key to the preparation of the AB documents. Our primary customer, DOE, is actively involved in identifying and implementing process improvements through Appendix F and is involved in all aspects of preparation and approval of AB documents, and their environmental sustainability approval through the ESH-ID. Suppliers and subcontractors are folded into our processes, as described in previous chapters.

Area to consider: How does your organization manage processes to exceed corporate environmental performance goals?

In addition to the analysis and improvement carried out in the above processes and reported in connection with Appendix F measures, the division uses the LANL framework of annual ISM self-assessments to identify significant environmental performance issues. This framework requires each division to assess its ES&H performance. Self-assessment findings are institutionally reviewed by the LANL Feedback & Improvement Board, which sets improvement priorities and goals. In addition, the division conducts monthly surveillance of all waste disposal areas, since these have been a source of environmental violations in the past. Results of these surveys are reported to the appropriate group leaders and the division leader for action. The walkaround program provides an opportunity for many people to look at and review processes and identify potential problems and improvements.

All ESA personnel take results of compliance reviews from organizations such as NMED very seriously. Any violations are addressed immediately. Findings that are questionable are discussed with the inspecting organization. ESA is constantly looking at ways to improve the performance in subsequent appraisals.

Area to consider: How does your company communicate information on improvement projects (both success and failures) to assure organizational learning?

Improvement effort results and compliance success are communicated to division managers at management sessions and to Laboratory senior management as part of the Appendix F quarterly assessments. DOE learns of results through formal institutional lines of communication, and other stakeholders (vendors, the community) are informed through other Laboratory contacts. Annual publications also provide stakeholders with yearly updates on environmental performance.

Area to consider: How does your organization uses benchmarking as part of ongoing process improvement activities?

Division management has acknowledged that benchmarking against counterparts such as LLNL is a potentially productive exercise if we are to achieve environmental excellence in our class. The mechanism for benchmarking is Appendix F. Management has



committed to incorporating Appendix F benchmarks in to the next round of strategic planning.

Area to consider: How does your organization improve its process improvement system?

ESA's process improvement systems are tied to ISM and the LIRs. As these change, ESA adapts its systems. If we discover a problem with a system, then the problem is fed back immediately to the owner of the system. See, for example, Figure 6-1, steps 14 and 15.

ESA Division has a contractual mandate to continuously monitor and analyze processes for potential improvements. The cost of permitting, handling, and disposing of waste is a significant fraction of the division's operating cost so there is serious motivation to reduce the volume of waste generated. In general, ESA plans and manages environmental requirements by evaluating processes and procedures for waste minimization opportunities. These evaluations have led to such results as those listed in Chapter 7.

7 Results

7.1 Environmental Results

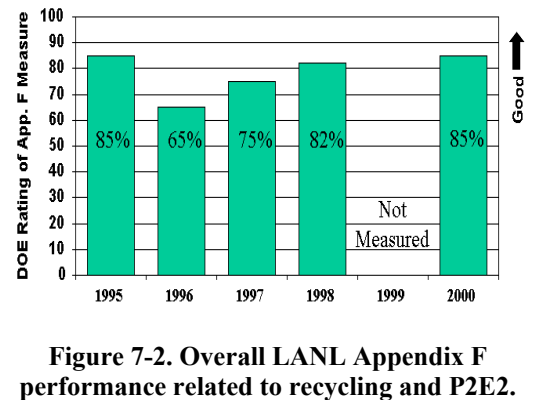
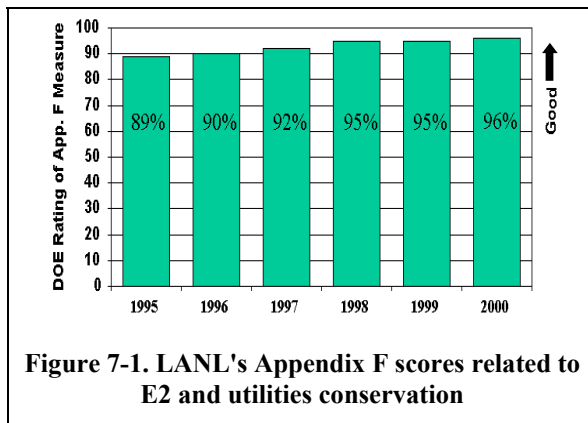
Throughout this application, ESA has described how Appendix F is used to set goals for environmental improvement and how the five-step ISM process is used to achieve those goals. This chapter will describe the results of implementing this process. However, LANL is a research, not a production, facility. Therefore, many of the production-related areas to consider cited in the guidelines for this chapter are not directly applicable to LANL. For instance, we do not directly measure efficiency and production, and the materials we use vary with constantly changing research projects. However, certain of these areas to consider do apply to ESA activities, and these will be addressed.

Area to consider: Summarize current levels and trends in the use of materials.

Area to consider: Summarize current levels and trends of water conservation and energy conservation measures.

Area to consider: Summarize current levels and trends related to energy conservation, energy efficiency, and renewable energy usage.

LANL has specific Appendix F P2E2 goals. The trends in attaining these goals are shown in Figures 7-1 and 7-2. These figures indicate that LANL is performing in a category that provides us with a “good” rating from DOE, our primary customer.



ESA is a major contributor to this overall performance. Using the methods for continuous improvement for strategic and action planning described in Chapter 2, ESA performs P2E2 analyses by project to determine where material usage can be reduced, where energy efficiency can be improved, and where water, waste and air emissions can be reduced. The results from some of these analyses are described below.

Materials Reduction: ESA has implemented a very successful coolant reduction project in our machine shops. Large amounts of biocide coolant were used for machining parts. The coolant was hazardous to the environment and potentially hazardous to workers. The coolant had a maximum useful life of two months, but it quickly developed a bacterial coating that rendered it unusable, requiring frequent disposal—as often as once a week. In 1995, to reduce waste and move beyond mere compliance with environmental regulations, we began replacing the potentially harmful chemicals with water-based coolants containing 98 percent water and 2 percent rust inhibitors, and no biocides. We invested in passive skimmers that re-circulate and filter the coolant, extending its useful life by eliminating bacterial growth in the coolant sump. The useful life was extended over a year, and waste was reduced 97 percent, from 14,400 kilograms per year to 400 kilograms per year, and annual disposal costs dropped from \$102,000 to \$3,000. These same changes have now been successfully implemented at other DOE sites. We realized that we could go beyond this success by investing in an evaporator that removes water from the used, discarded coolant. The evaporator transformed the machining coolant waste-stream into a zero-discharge closed-loop, annually yielding 2000 gallons of reusable oil that can be transferred to a recycling facility; the chemical waste-stream has been converted into a resource, and the end result is zero coolant waste. This project received capital funding from the GSAF program, and the personnel who conceived and implemented the project received P2 awards from E-ESO.

Another successful materials reduction project was implemented in 1998, when ESA substituted propane for wood as the fuel used to flash HE-contaminated materials. This had several beneficial effects:

- Air pollutants were reduced by an order of magnitude because propane burns much cleaner than wood.



- The wood, not the HE-contaminated materials, generated almost all the ash. The change to propane reduced ash by 3 tons per year. The ash previously had to be disposed as New Mexico Special Waste, even though it was tested and determined to be non-hazardous. The elimination of the ash has assisted LANL in achieving our 80 percent reduction in hazardous waste (which includes New Mexico Special Waste).
- The propane burns much more evenly than wood. Therefore, the temperatures on/in the HE-contaminated materials can be measured and the HE certified as destroyed. This allows ESA to recycle metals that previously had to be disposed in the TA-54 landfill. ESA was able to recycle approximately 10,000 pounds of formerly HE-contaminated metal in 2000 and expects to double this in 2001.

This project received partial funding from the GSAF program.

Water Conservation: Water has historically been used in the processing of HE, because HE-contaminated water is relatively safe compared to HE in a dry state. During LANL's first 50 years of operation, we used millions of gallons of water each year in HE-processing applications, and the wastewater generated was discharged to the environment. During the 1990s we implemented the HE Wastewater Treatment project, which was completed in 1998. By treating water at the source and reusing it, we were able to reduce the volume of water used in explosives processing facilities from 12,000,000 gallons of potable water per year to 130,000 gallons per year, a reduction of 99 percent. It allowed us to reduce the number of explosive-permitted outfalls—outlets where wastewater is discharged—from 21 to 2. It allowed us to delay the discharge of wastewater into the environment until testing confirmed compliance with environmental regulations. This trend of reduced water usage and discharge (<130,000 gallons/year after 1998 vs. 12,000,000 gallons prior to 1998) will continue for the foreseeable future. Also, because the volume of wastewater has been reduced by 99 percent and because of enhanced water treatment, only about 0.2 percent of the original organic pollutants are discharged to the environment. This project received the 1997 Silver Award from DOE for outstanding customer service as part of a team effort. In 2000, ESA staff independently developed a more efficient way of operating this facility that resulted in even greater removal efficiency. Employees received an ESO P2 award in 2000 for this work.

Energy conservation: Energy conservation is practiced at several different scales at ESA. On a small scale, ESA encourages personnel to install sensors that deactivate lights when no movement is detected in a room or to turn out lights in areas not in use. Personnel are also encouraged to set their computers to “sleep” when not in use. On a larger scale, ESA also participates in large-scale projects. For example, in 1995, ESA, DOE, and Johnson Controls of Northern New Mexico partnered to replace the aging and oversized TA-16 Steam Plant with small package boilers. These small, efficient boilers have reduced gas usage and air emissions by more than an order of magnitude. The old boiler used approximately 300,000,000 cubic feet of natural gas per year. The new boilers, combined, use less than 200,000 cubic feet per year for the 5 years they have been in operation. These types of projects have assisted LANL in meeting the E2 and utilities conservation measures of Appendix F. Figure 7-1 shows LANL's overall score.



ESA is currently planning a major five-year project to replace our existing outmoded facilities with modern facilities. When implemented, space used to support ESA operations will be reduced by 300,000 square feet, with a savings of approximately \$80,000,000 in facility costs, part of which is for energy, water, and other utilities.

Area to consider: Summarize current levels and trends in waste generation.

LANL has various goals for waste generation that vary by the type of waste. For instance, LANL has committed to DOE in Appendix F to reduce hazardous wastes by 80 percent by the year 2005, using 1993 as a baseline. Progress toward attainment of these goals is assessed through the Appendix F measures related to P2E2. Figures 7-1 and 7-2 summarize the Appendix F trends associated with this measure.

ESA is a major contributor to this successful performance. ESA's contribution to materials substitution and reduction and energy conservation is discussed above. In addition, ESA has aggressive programs in recycling (metal, cardboard, oil, batteries, light bulbs, white paper, etc.). Several of our programs are described below.

Machine Shops Waste Reductions: In the early 1990's, the WMM Machine Shop produced numerous waste-streams ranging from scrap paper to radioactive scrap metal and hazardous industrial chemicals. To address the large volume of product and process waste from potentially radioactive waste streams, we initiated a major, yet low-cost change by segregating all machining equipment and tooling, designating these for use with either radioactive or non-radioactive materials. Workers followed with other waste prevention ideas by segregating material waste so items would not automatically be designated as contaminated waste. To address the specific problem of contaminated machining materials, all potentially radioactive scrap was segregated for further monitoring. Now, due to custodian initiative, even floor sweepings are segregated and surveyed for radioactivity, and when possible, kept out of the radioactive waste-stream.

The same machine shop generates annually over 11.5 cubic meters (680 kilograms) of machine metal scrap shavings, all of which is assumed potentially contaminated, even though only a minute fraction is actually radioactive, and that, only at very low levels. Manual separation of the radioactive scrap metals proved unsatisfactory, as the shavings tend to ball up. Manual results were only 40 percent successful. In 2000, ESA purchased a commercially available metal chipper and conveyor system modified with a radiological monitoring system that would automatically detect radioactivity. The chips are automatically monitored and, when contamination is identified, a hand-held monitor is used to segregate the contaminated chip. With the chipper, the radioactive waste is separated out, resulting in a volume reduction of 95 percent. The large residual volume of "clean" metal (over 630 kilograms annually) can be recycled. In addition, the Ludlum Company, who built the prototype, has decided to add the monitor to their product line, making this new radiological monitoring tool available to the entire nuclear industry. Annual disposal cost savings of \$27,000 are anticipated for FY 2001.

Overall reduction in hazardous waste at the shops has dropped progressively since FY 1995. In that year the shops produced 26,302 kilograms of hazardous waste. By FY 2000 that number had fallen to 851 kilograms, a decrease of 96 percent, with an annual cost savings of \$279,961.



Other Waste Recycling at ESA:

- ESA began recycling oil in 1998; quantities recycled have steadily increased to approximately 18,000 gallons in 2000.
- ESA began recycling cardboard in 1998; the amounts have grown from 8200 pounds in 1998 to 19,800 pounds in 1999, to 24,200 pounds in 2000.
- In 2000, ESA recycled more than 98,000 pounds of metal; this does not include construction waste.
- In 2000, ESA identified an offsite treatment facility to receive its granulated activated carbon for recovery and reuse; this will reduce waste by approximately 20,000 pounds.
- In 2000, ESA recycled approximately 2040 pounds of batteries.
- By more careful segregation of HE-contaminated waste starting in 1996, ESA reduced contaminated combustibles by approximately 1 ton per year by 1999, which allowed the closure of the HE trash incinerator.

Area to consider: Summarize current levels and trends in efficiency related to environmental improvement efforts.

Area to consider: Summarize current levels and trends in productivity related to environmental improvement efforts.

Area to consider: Summarize current levels and trends in employee satisfaction, skill development, and involvement related to environmental improvement efforts.

As a research facility, LANL has a constantly changing set of processes and products. Therefore, the production concepts of efficiency and productivity, generally applied to a single product, are not particularly applicable. Instead, Appendix F is the method we use to set environmental improvement goals and measure our progress in attaining them. The Appendix F measures have been presented in previous chapters. Employee satisfaction, skills development, and employee involvement have already been extensively discussed in Chapter 5.

Area to consider: Summarize current levels and trends of environmental safety, and health impacts of your processes, products, or services.

Area to consider: Summarize levels and trends of other environmental results achieved through your prevention-based environmental management system.

Area to consider: Summarize current levels and trends of compliance, regulatory requirements, and workplace safety.

Area to consider: Summarize current levels and trends related to your organization's environmental, health, and safety and prevention performance measures.

ESA uses the Quarterly Appendix F Self-assessment as the method to track current levels and trends of environmental safety and health impacts of implementing ISM. Figure 7-3 shows the trends from ESA's quarterly Appendix F Self-assessment for environmental compliance. In January 1998, when the tracking started, our performance was "adequate." By mid-1999 our performance had risen to "good," where it remains.



See Item 5.3 for a discussion of trends in workplace safety as relates to total recordable injuries and lost workday cases. Safety walkarounds, also discussed in Item 5.3 and summarized in Figure 5-3, is relevant in this connection. Overall trends in the number of safety walkarounds is up, as indicated by Figure 7-4. The division conducts more than twice the number of walkarounds called for in Appendix F.

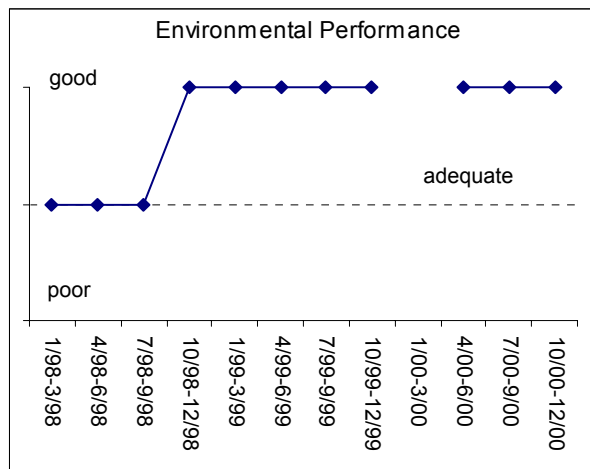


Figure 7-3. ESA's Appendix F Self-assessment results for Environmental Performance and Accident Prevention.

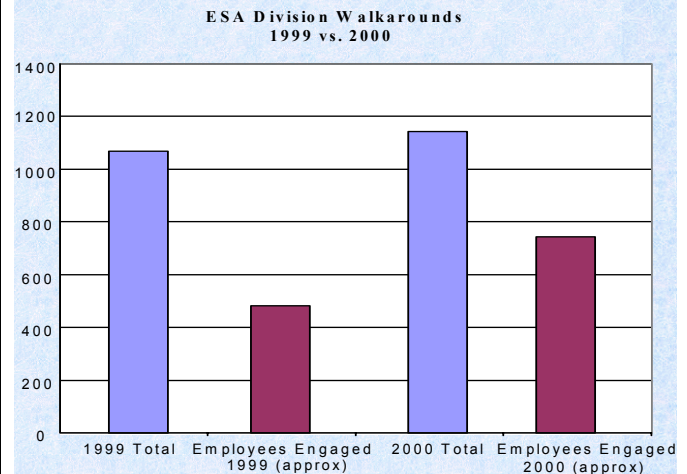


Figure 7-4. ESA safety walkarounds.

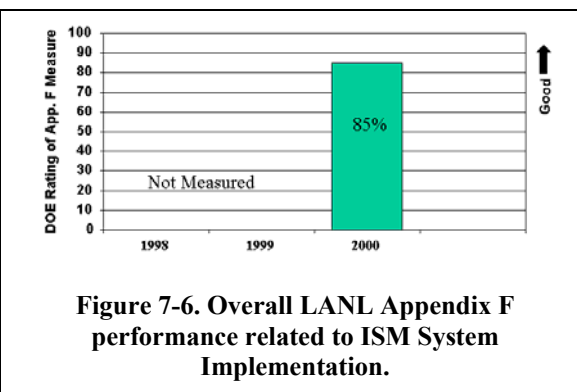
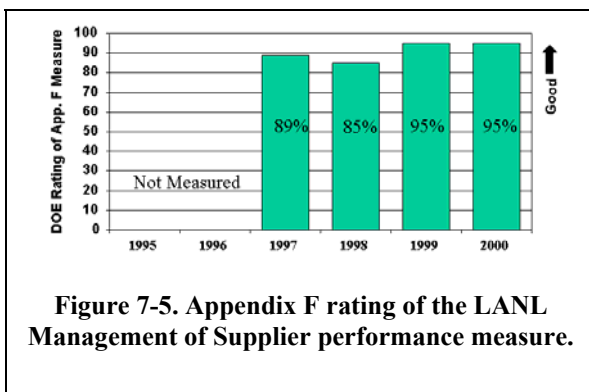
7.2 Customer, Supplier, Employee, and Other Results

Area to consider: Summarize current levels and trends in customer satisfaction or dissatisfaction in the performance and quality of your organization's service, products, or production processes.

Area to consider: Summarize current levels and trends and results in interested parties or others' involvement in your organization's continuous environmental improvement approach.

Area to consider: Summarize current levels and trends of other results related to the continuous environmental improvement approach.

For our major customer, DOE, ESA Division uses the Appendix F Process as a way to identify customer requirements and to gather feedback regarding customer perception of division performance. Figures 7-1 through 7-6 show overall LANL performance, to which ESA Division contributes, for recycling, P2E2, management safety walkarounds, and supplier performance—all key measures of success for ESA service, products, and processes. ESA also received an “excellent” rating on the Science and Technology section of Appendix F in 2000 and improved to “outstanding” in 2001.



The public and regulatory agencies are other interested parties and customers with a stake in LANL's environmental performance. Involvement with the public has been extensively discussed elsewhere. Figure 7-7 shows trends in public perception of LANL's environmental performance. Information in this particular format is not available after 1998 because LANL changed the survey questionnaire. In the new survey, which is administered annually to community leaders, environmental performance is not specifically addressed. Several open-ended questions do allow respondents to raise topics of concern. Figure 7-8 shows results for three years indicating the percentage of leaders who view LANL favorably. Figure 7-9 shows results from 2000 indicating the percentage of leaders who view LANL as a good corporate citizen. Figure 7-10 shows exceptionally high Appendix F ratings for LANL's performance in meeting socioeconomic commitments.

Area to consider: Summarize current levels and trends of employee involvement and satisfaction resulting from your organization's continuous environmental improvement approach.

Employee involvement and satisfaction have already been extensively discussed in Chapters 2 and 5. The metrics for measuring satisfaction are provided in Chapter 5.

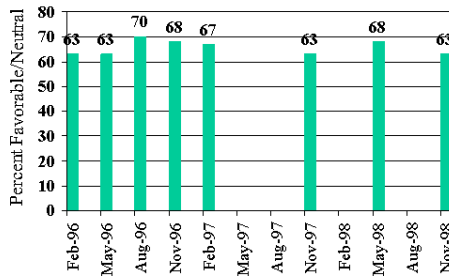


Figure 7-7. Percentage of New Mexico residents who view LANL environmental performance as favorable or neutral.

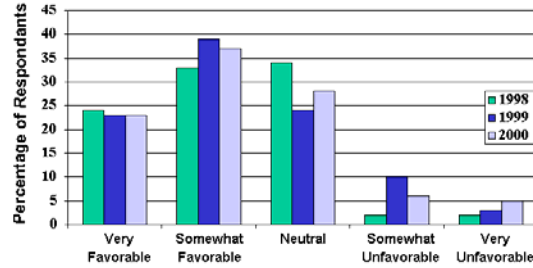


Figure 7-8. Community leaders' view of LANL.

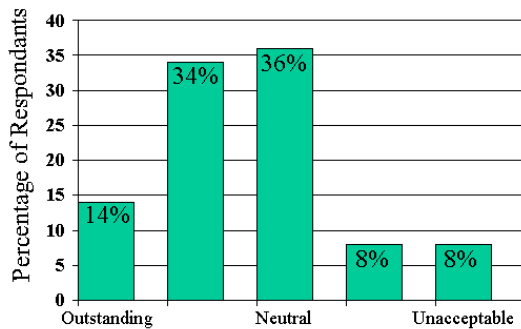


Figure 7-9. Community leaders' view of LANL as a corporate citizen.

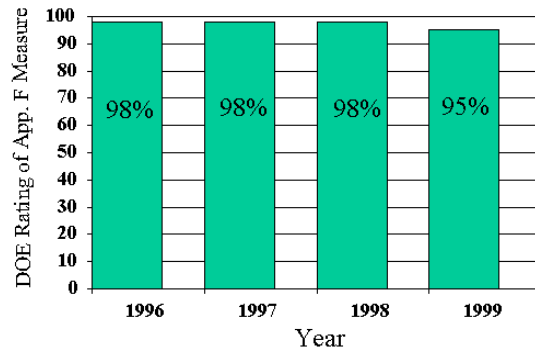


Figure 7-10. Appendix F rating of the LANL Meeting Socioeconomic Commitments performance measure.

Area to consider: Summarize current levels and trends of supplier and vendor environmental performance resulting from your organization's continuous environmental improvement outreach efforts.

Area to consider: Summarize current levels and trends of environmental and economic performance resulting from your organization's continuous environmental improvement outreach efforts.

Area to consider: Summarize current levels and trends in market expansion or new market development for green products or waste-to-product activities.

Area to consider: Summarize current trends and results in marketing related to continuous environmental improvement.

LANL's extensive supplier and vendor programs and community involvement program have already been described in Chapters 0 and 1, along with our new market/product development and technology transfer for "green" products. The indicator of LANL's and ESA Division's success in these areas is derived from Appendix F performance measure 1.4.a in the functional area of procurement. This measure evaluates ability to meet socioeconomic commitments in the local region. Figure 7-10 shows that performance for the past four years has been exceptionally high. Several other customer results derive



from specific Appendix F measures. Figures 7-1 and 7-2 in Item 7.1 show overall LANL performance, to which ESA Division contributes, for E2 and utilities conservation and for recycling and P2E2 performance. The ESA projects summarized in Item 7.1 have contributed significantly to these successful Appendix F findings. Figure 7-5 above presented Appendix F scores for the management of suppliers. Although this is an institutional measure coordinated primarily through LANL's BUS Division, ESA Division performance does contribute to this measure of customer satisfaction.

7.3 Financial Results

Area to consider: Summarize current levels and trends in financial investments related to environmental improvement efforts.

ESA continues to provide considerable support to the institutional efforts described in Chapter 0. These institutional investments are more \$13,000,000 per year. ESA also invests considerable time and money in implementing the five-step ISM process. However, there is no way to directly measure this investment. What are more quantifiable are project-specific costs. Costs for some of the projects described above are listed in Table 7-1. These cost estimates are on the low side because they usually do not represent much of the labor that is invested in these projects. The costs shown for the ESA five-year plan are somewhat speculative because the project is in the early design phases.

Table 7-1. ES&H-related project costs.

Project	Approximate Cost (\$)
HE Wastewater Reduction	5,500,000
Propane Burner Installation	750,000
Machine Shop Coolant Equipment	40,000
Chipper Shredder Equipment	125,000
ESA five-year Plan	65,000,000

Area to consider: Summarize current levels and trends in cost savings and cost avoidance through the implementation of a prevention-based environmental management system.

While ESA has significantly reduced wastes, the costs of supporting the institution's programs generally do not decrease, because they are supporting an infrastructure that is slow to decrease in size. Also, recycling and other methods of waste reduction are often more expensive in the short run than disposal of the waste. For instance, figures used in a recent study identifying options for the Los Alamos County Landfill indicated that recycling costs more than twice as much as landfill disposal. Clearly, LANL feels that **we are investing in the future rather than reducing costs in the near term.**

Rather than trying to estimate general trends (which may actually show increased costs), ESA has summarized the project-specific cost savings from some of the activities mentioned earlier in this chapter in Table 7-2. Some assumptions had to be made to estimate these costs. For instance, cost-saving metal and cardboard recycling were calculated by assuming that \$657 per ton would have been paid to dispose of the material



in the county landfill (FWO-SWO estimate). Wastes that would have been treated as hazardous (e.g., oil, ash, and batteries) were assumed to cost \$1 per pound to dispose of (an estimate based on current LANL waste disposal costs through the FWO-SWO waste support group). Cost savings in reduction of HE-contaminated wastewater that would have to be treated to meet current permit standards was estimated at \$0.30 per gallon.

Table 7-2. Cost savings from recent P2 projects.

Project	Waste Amount	Annual Cost Savings (\$)
Metal/Cardboard Recycling	206,200 pounds (103 tons)	67,671
Coolant	Reduced coolant costs from 102,000 to 3,000 per year	99,000
HE Propane	Reduction in ash generation by 6,000 pounds per year	15,000
HE Wastewater	12,000,000 gallons	3,600,000
Oil	18,000 gal (16,000 pounds)	16,000
Batteries	5200 pounds	5,200



Acronyms

AB	authorization basis	LANL	Los Alamos National Laboratory
BUS	Business Operations Division		
CER	Community and External Relations Division	LIRs	Laboratory Implementation Requirements
CIO	Community Involvement and Outreach Office	LLNL	Lawrence Livermore National Laboratory
DNFSB	Defense Nuclear Facilities Safety Board	LPRs	Laboratory Performance Requirements
DOE	Department of Energy	NEPA	National Environmental Policy Act
E	Environmental Science and Waste Technology Division	NMED	New Mexico Environment Department
EO	Executive Order	OSHA	Occupational Safety and Health Administration
EPA	Environmental Protection Agency	PDCA	plan-do-check-act
ESA	Engineering Sciences and Applications Division	P2	pollution prevention
ESH	Environment, Safety, and Health Division	SBI	Small Business Initiative
ES&H	environment, safety, and health; Environment Safety and Health Team	SBO	Small Business Office
ESO	Environmental Stewardship Office	SCP	Safety Concern Program
ER	Environmental Restoration	SOP	standard operating procedure
E2	energy efficiency	SWEIS	Site-wide Environmental Impact Statement
FSP	facility safety plan	SWO	Solid Waste Operations
FWO	Facilities and Waste Operations Division	TA	technical area
GSAF	Generator Set-aside Fee	UC	University of California
HCP	hazard control plan	WMC	Waste Management Coordinator
HE	high explosive(s)		
ID	identification		
ISM	Integrated Safety Management		
JIT	just-in-time		